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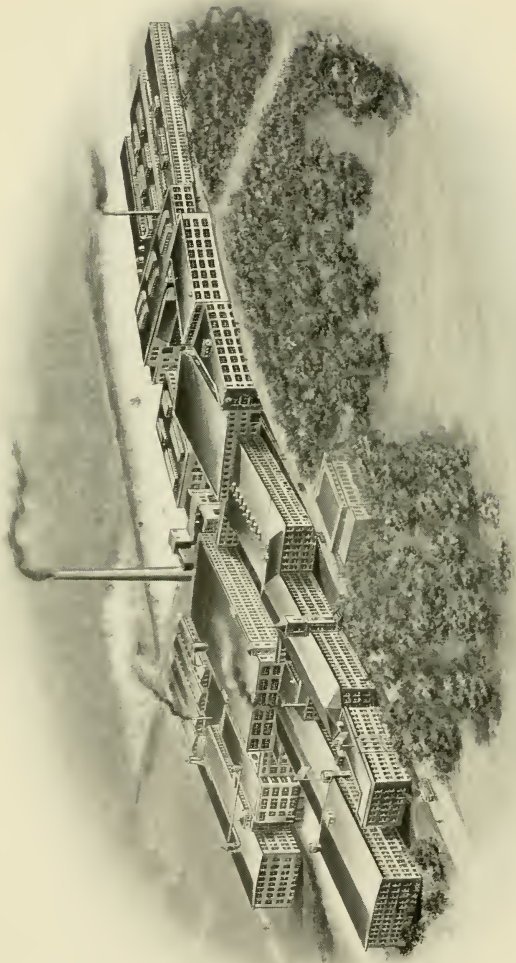




**WHITIN**  
**COTTON YARN**  
**MACHINERY**

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**1923 EDITION**



MAIN OFFICE AND WORKS

ILLUSTRATED AND DESCRIPTIVE  
CATALOG  
*of*  
**WHITIN**  
**COTTON YARN MACHINERY**  
AND

Handbook of Useful Information  
For Overseers and  
Operatives

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FOURTH EDITION

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**WHITIN MACHINE WORKS**

Whitinsville, Mass., U. S. A.  
Branch Office, Charlotte, N. C.

Press of  
C. A. HACK & SON, Inc.  
Taunton, Mass.  
U. S. A.

MB · 5536

## INTRODUCTORY

**I**N compiling this fourth edition of our catalog on Cotton Yarn Machinery we have endeavored to describe as concisely as possible the various machines as improved since the issue of the third edition in 1919. With the descriptions we furnish data such as floor spaces, speeds recommended, weights, power consumption, production, change gear tables, rules for operatives, etc., which we trust will be found useful to anyone operating our make of machinery.

It may be of interest to our customers and others to know that the manufacture of Cotton Machinery was commenced in Whitinsville in 1831, and that our working plant, exclusive of tenements, now comprises forty acres of floor space, and at full capacity requires 4000 employees. In recent years many new tools and appliances have been installed for the accurate and rapid production of our machines, and at the present time we are in a better position than ever to promptly meet our orders and furnish machines which are unequalled as regards design, material and workmanship. These superior manufacturing facilities have been augmented by an exacting and rigorous system of shop inspection, to the end that the high reputation for superior quality of our machines shall be maintained.

We are always pleased to discuss the requirements of textile manufacturers and others, furnish estimates of machinery for new mills or reorganizations of old mills, and give any further information desired concerning our machines which are not treated of in this catalog.

WHITIN MACHINE WORKS.

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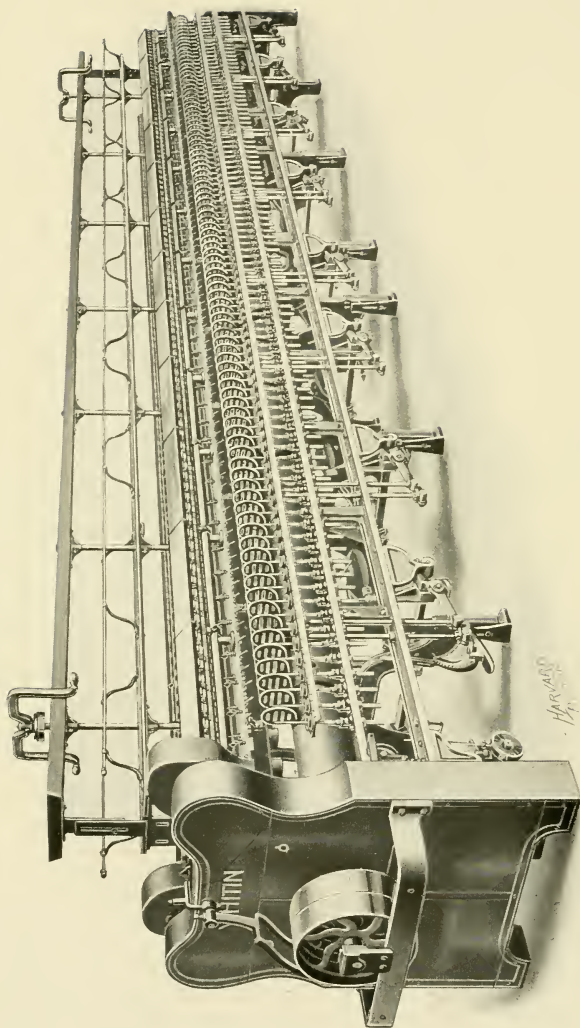
## **NOTICE**

Owing to changes that may have been made in the details of our machines since the issue of this catalog, we cannot assume any responsibility for the dimensions and floor plans given in the catalog unless verified by our Engineering Department. Up-to-date floor plans should be obtained from us before planning for the installation of our machines.

**Whitin Machine Works.**

# SPINNING

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Ring Spinning Frame, with Band Driven Spindles  
Model A.

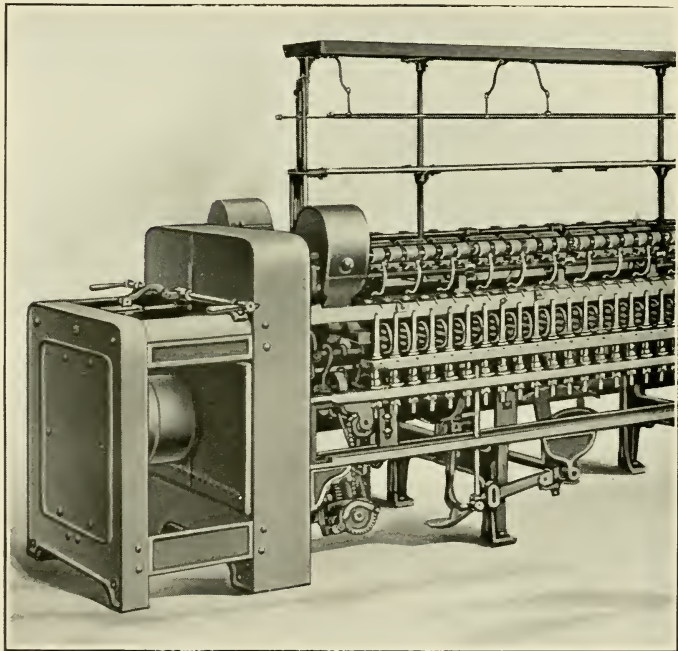


Ring Spinning Frame, with Tape Driven Spindles  
Model B.

# THE WHITIN RING SPINNING FRAMES

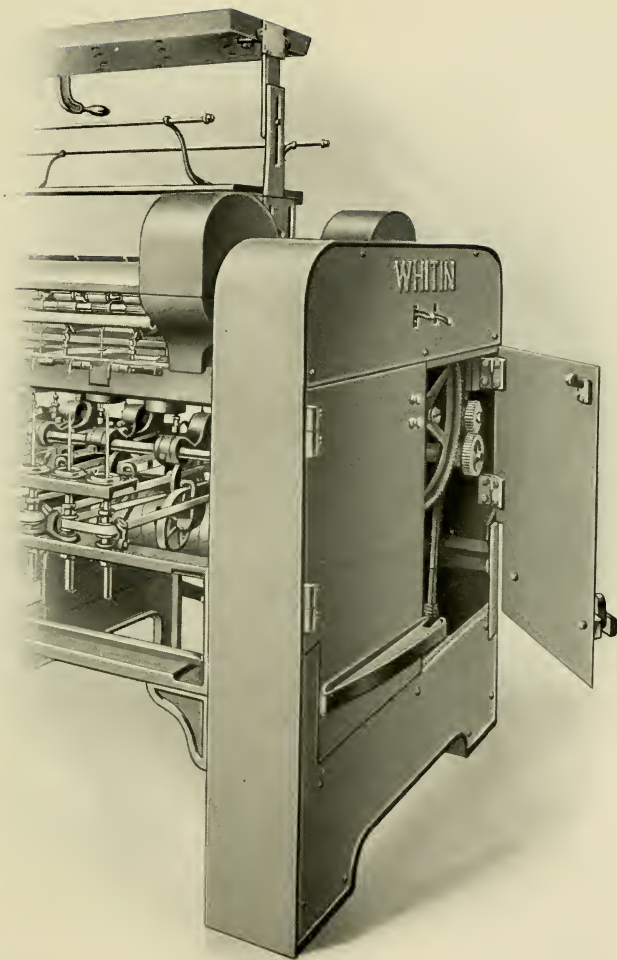
For Cotton Warp, Filling and Hosiery Yarns

[The **Whitin Spinning Frames** command today, as they always have in the Past, a leading position with regard to design, construction and operative features. Four types are made, viz.: Model A, Model B, Model C and Model D, differing from each other in the drive of their spindles, and, also in their gearing mechanism.



Frame with Outboard End

**Model A** (see illustration, page 12) is equipped with band driven spindles and a chain driven builder motion. This frame is usually furnished only for matching up old equipment.



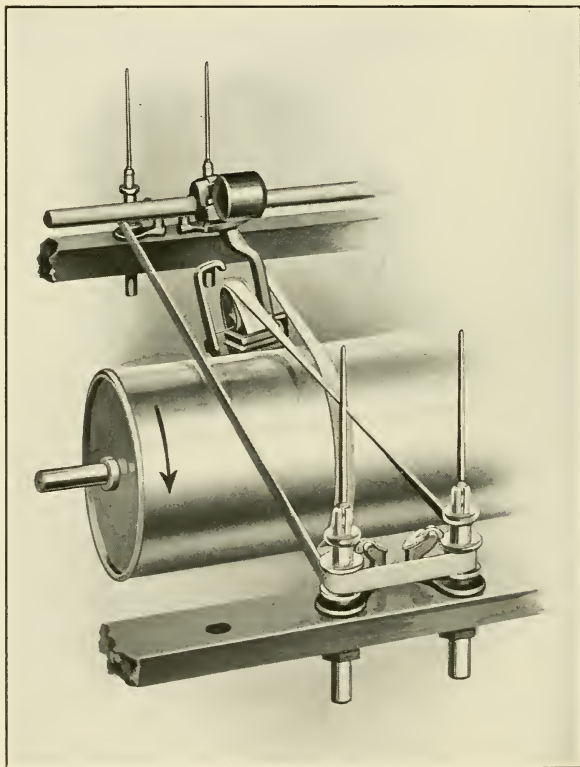
Head End with Swinging Panels



**Model B** (see page 13) has tape driven spindles and a shaft driven builder motion. It is a popular type with manufacturers.

**Model C** is similar in design to Model B, with the exception of being equipped with band driven spindles.

**Model D** is similar in general construction to Model B, but has some features making it especially adapted for export trade.



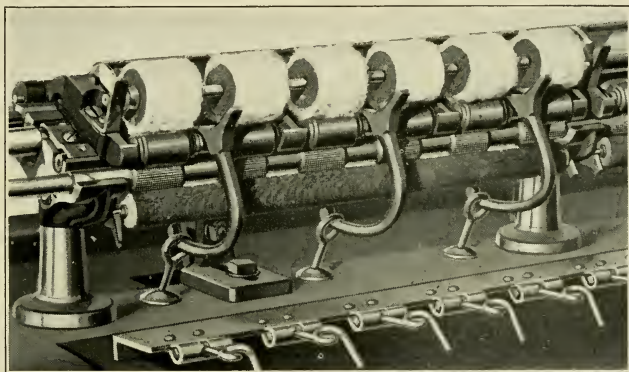
**Tape Drive**



The following description of details of construction is applicable to all types of frames:

**The Framing** is substantial, with extra wide roll beams and spindle bolster rails on the double web rail principle, with bridge connections between sampson supports. The foot end and sampsons are provided with loose feet for adjustment to suit uneven flooring.

**The Head End** is specially designed to facilitate the necessary twist gear changes. Cut gearing with wide faces is used. Convenience is provided for oiling, and all parts that are not readily accessible for oiling are provided with oil tubes, having their orifices placed in positions convenient to the operatives. The ends of the frame are enclosed by either swinging or sliding panels which form guards against accident.



**Revolving Clearer**

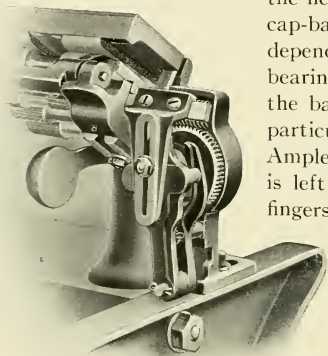
**The Fluted Rolls** are made of the best roller steel, and are irregularly fluted to avoid liability of cutting the covering of the top-rolls. All rolls are fitted together and numbered in the shop, to insure proper running in the mill.

We are equipping most of the frames we now build with **Front Steel Rolls Case-Hardened** and in a good many instances we case-harden all three lines. This hardened roll is beautifully finished, and is highly desirable because the flutes remain sharp for a much longer time than those of the ordinary crucible steel roll, as the outer casing of the roll is so hard, it is not so readily nicked by the spinners' hooks, and wearing of the roll necks is obviated.

**The Top-Rolls** are usually furnished covered, either shell or solid, and weighted with any of the various saddles on the market, as desired by the purchaser. Self-weighted top-rolls are also furnished to the mills preferring this method of weighting.

**The Top-Roll Clearers** may be either stationary or revolving style as preferred.

**The Roll Stands** with their adjustable slides have milled bearings for steel rolls. The bearings are of such width as to insure long life to the neck of the rolls. The detachable cap-bars are arranged to work independently, the finger at each bearing being divided so that when the bar is thrown back, only its own particular set of rolls is affected. Ample space for oiling the roll bearings is left between the halves of cap-bar fingers over the roll bearings.



A variable **Roving Traverse Motion** is supplied. It is adjustable as to length of traverse, and has a variable motion, which prevents unequal wear of leather top-rolls.

#### **Roving Traverse**

Our Frames are equipped with either band or tape driven **Whitin Gravity Spindles** as ordered. These spindles are notable for simplicity of construction, steadiness in running, and durability. In addition, they possess great advantages in consuming a minimum of power and the avoidance of throwing oil. They are made in three standard sizes, viz:

Standard Gravity	No. 1
Medium Gravity	No. 1
Large Gravity	No. 1

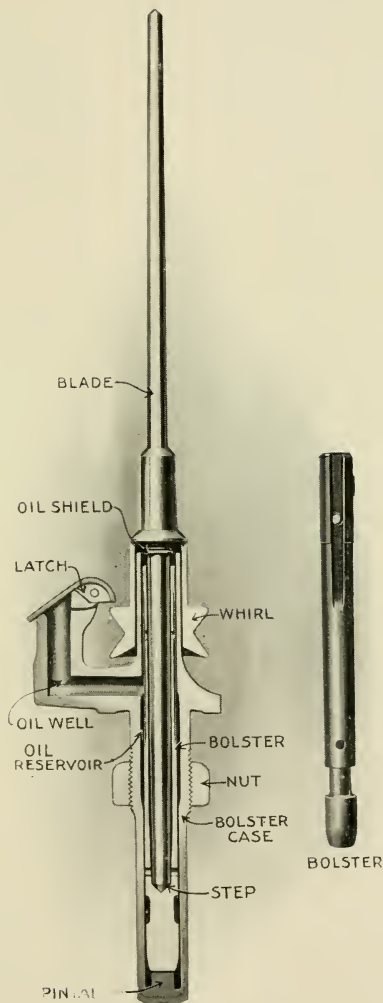
All these spindles are of the same general construction, but vary as to sizes and diameters of whirls.

A very popular spindle is the Whitin Gravity Spindle fitted with centrifugal clutch.

We are also prepared to make Draper No. 2, No. 4 and No. 5 types of spindle, and can furnish Rabbeth, Sherman or McMullen spindles when ordered.

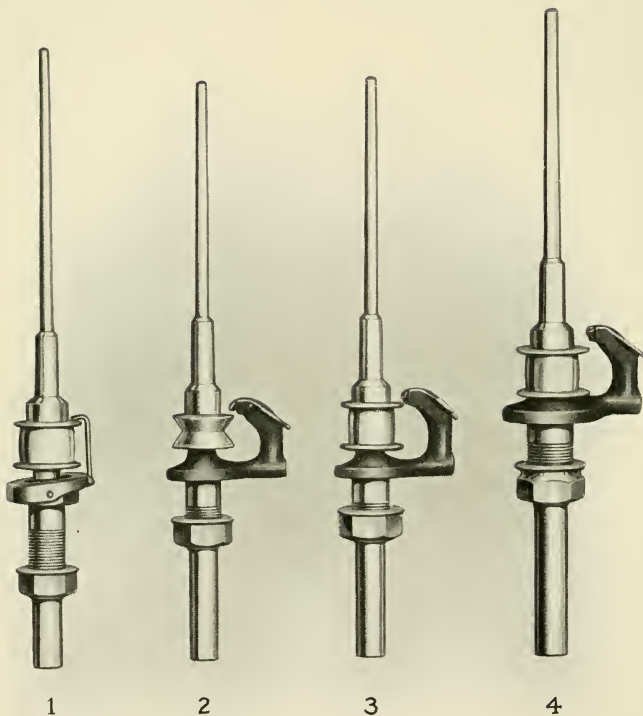
For spinning warp yarns, we recommend the Large Gravity Spindle for coarse yarns, from 4's to 12's, the Medium Gravity Spindle for all counts, from 12's to 24's, and the Standard Gravity Spindle on all finer counts.

For spinning filling and hosiery yarns, we recommend the Medium Spindle on coarse counts to 20's, and the Standard Spindle on all finer counts.



Section of Whitin Gravity Spindle

# Whitin Spindles



- 1—Shows a 3A Spindle with Steel Bolster Case.
- 2—Shows a Medium No. 1 Spindle.
- 3—Shows a Standard No. 1 Spindle.
- 4—Shows a Large Gravity No. 1 Spindle.

# Spinning Rings



Double-Adjustable  
Ring.



Single Flange  
Ring.



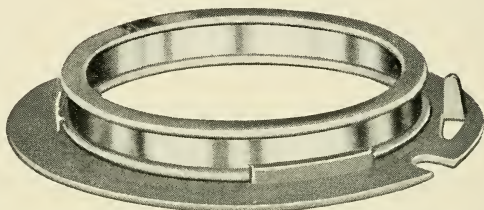
Common  
Spinning  
Ring.

We also recommend the use of large whirls on spindles, as this tends to give a regular speed, uniform twist, less breakage of bands, and a reduction in repairs in spindles and cylinders.

The following spindles are what might be called "Regular", as regards sizes of whirls:

Standard	No. 1	with	$\frac{15}{16}$ "	diameter whirl
Medium	No. 1	"	$1\frac{1}{8}$ "	" "
Large	No. 1	"	$1\frac{5}{16}$ "	" "

To suit special conditions the Standard Spindle may be fitted with  $\frac{3}{4}$ ",  $\frac{13}{16}$ ",  $\frac{7}{8}$ " or 1" diameter whirls; the Medium with  $\frac{13}{16}$ ",  $\frac{7}{8}$ ",  $\frac{15}{16}$ " 1",  $1\frac{1}{16}$ ",  $1\frac{1}{4}$ " or  $1\frac{5}{16}$ " diameter whirls, and the Large with  $\frac{15}{16}$ ", 1",  $1\frac{1}{16}$ ",  $1\frac{1}{8}$ " or  $1\frac{1}{4}$ " diameter whirls; but, as a general rule, we prefer not to fit any spindle with less than  $\frac{7}{8}$ " diameter whirl, with the possible exception of the Standard Spindle.



**Double Adjustable Ring in Round Plate Holder.**

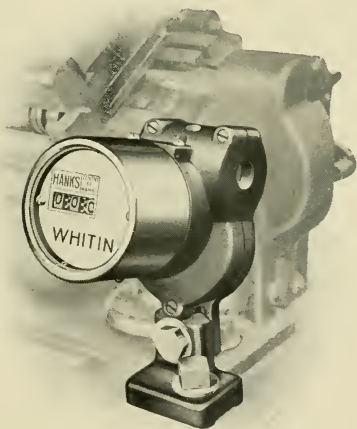


**Double-Adjustable Ring in Cast-Iron Holder  
with Inclined Pin Traveler Holder.**

**Rings** of our own make are supplied unless otherwise ordered, cast-iron or plate-ring holders as preferred. Efficient Traveller Cleaners can also be had if desired. The Ring Rails, of rugged construction, are made in short lengths, thus decreasing the liability of deflection. The rails are secured to milled heads of the lifting rods in such a manner as to prevent any undue vibration while working, and, at the same time, being easily removed when desired. The level of the rails is corrected by a novel construction of the lifting rod arms, as is best shown in the illustration of the separator motion on page 24.

If desired, our frames may be equipped with a **hank clock** of our own make, which registers the hanks and decimal part of a hank delivered by

the front roll. It is dust proof and constructed so as to be practically free from unauthorized adjustments by operatives.

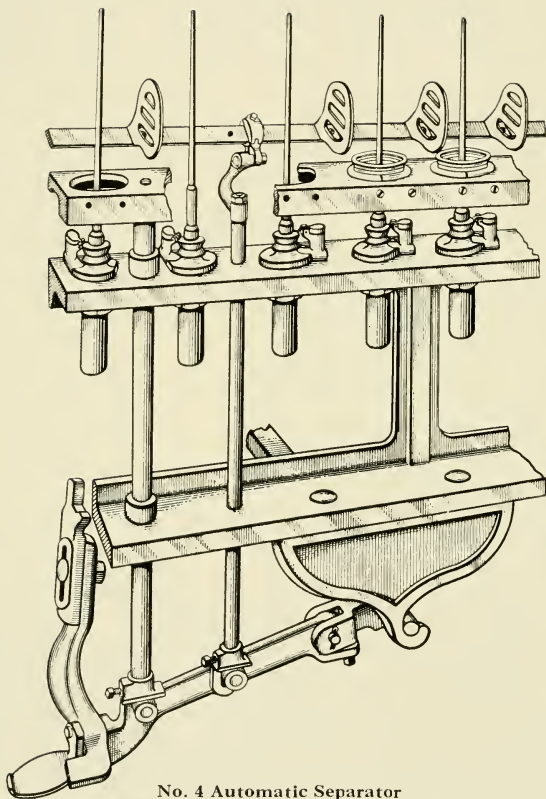


**Hank Clock**

To eliminate this evil, we recommend **Wide Gauge Frames**, as by eliminating the whip against the separator it can be readily appreciated that a higher spindle speed can be run and a better quality of yarn obtained. In the same floor space, wide gauge frames will give a yarn production equal to that produced on narrow gauge frames with more spindles, provided the gauge of the wide space frame is properly adapted to the number of the yarn.

To anyone contemplating the purchase of new frames, we advocate the adoption of wider gauges than have been customary heretofore to use, in order to dispense with the use of separators, which with narrow gauge frames are a necessary evil. By the use of separators the yarn must receive some damage due to its whipping contact with the separator blades.



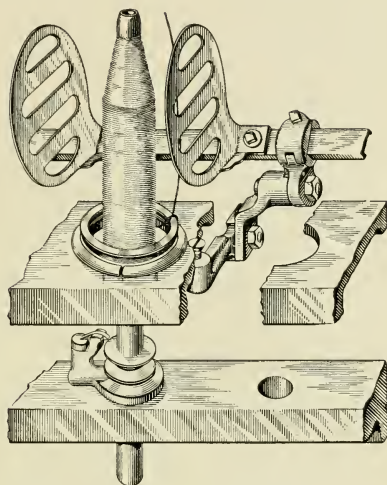


No. 4 Automatic Separator

Also, a better quality of yarn is produced at a less cost. If narrow gauge frames are ordered, we can furnish either our No. 4 or No. 5 Separator. The blades of the No. 4 Separator are made of stamped steel and are



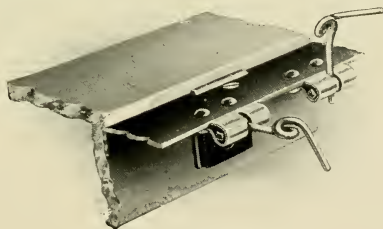
fastened to a rod hinged to brackets on top of auxiliary lifting rods which have a vertical reciprocating movement due to motion transmitted through the regular builder mechanism cross-shaft as will be readily understood by reference to the illustration. When doffing, the separator blades may be conveniently and quickly turned back out of the way. The No. 5 is of similar construction except the blade rod is held in brackets fixed to the ring rail.



NO.5 WHITIN SEPARATOR

The frames are equipped with **Thread Boards** of highly polished hard wood, unless metallic thread boards are ordered.

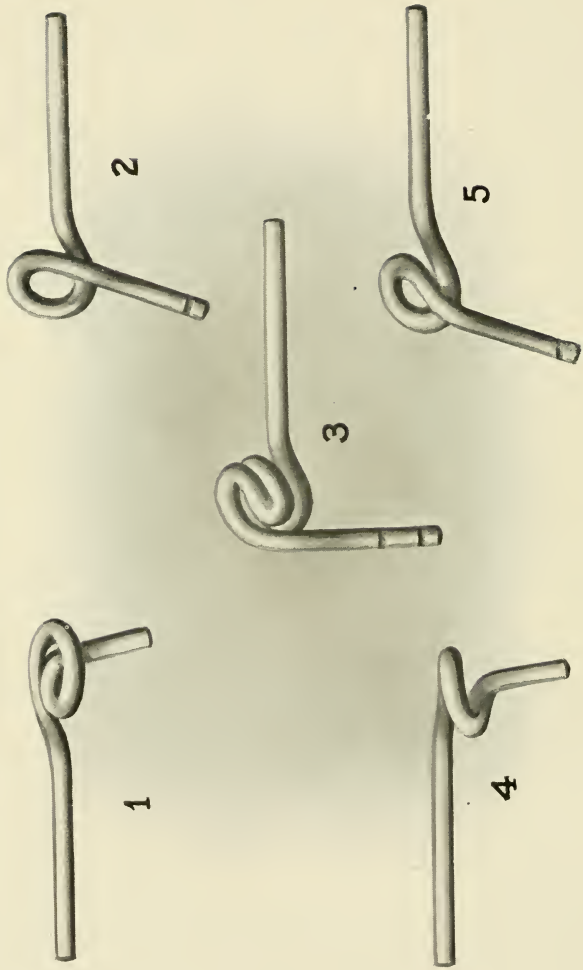
**The Whitin Patent Metallic Thread Board** is an important improvement to our frames. It consists of a sheet metal back, to which are fastened the thread guide pintal holders. This construction readily allows for lifting up each individual guide, or all the guides at once, as is required.



**Metallic Thread Board.**

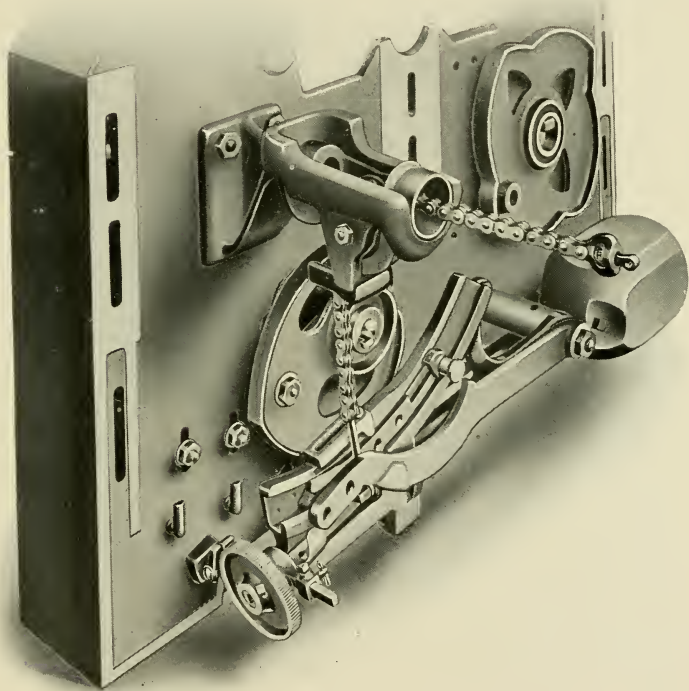
correctly adjusted, it is held in a fixed position by means of a set screw at one end of the pintal. Unintentional tilting of the guides is prevented by means of our patented locking device.

**The Thread Guide** can be accurately adjusted to the center of the spindle by moving its shank in or out of a hole in the pintal. When



Thread Guides

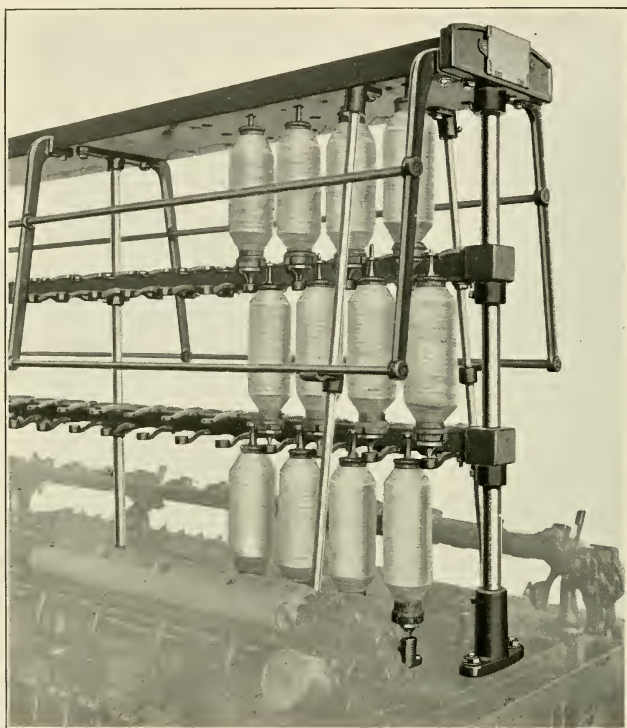
**The Builder Motion** is arranged for either warp or filling, or both, as desired. The change from warp to filling, or vice versa, is easily accomplished in a few minutes' time. The traverses are from 4" to 8". A **Locking Device** is provided for locking the ring rail during the operation



#### **Builder Motion**

of doffing. It is located so as to be conveniently operated by the foot of the spinner before proceeding to doff. It consists of an arm pivoted to head cross-shaft lifting arm in such a manner that when the lifting arm is depressed, the locking arm locks the ring rail at its lowest point automatically; a further slight depression disengages the arm which then drops back, and the ring rail is free to move.

**Wooden Creels** of usual construction are made either one or two stories for single or double roving, and are adjustable in height for any length of roving bobbin.

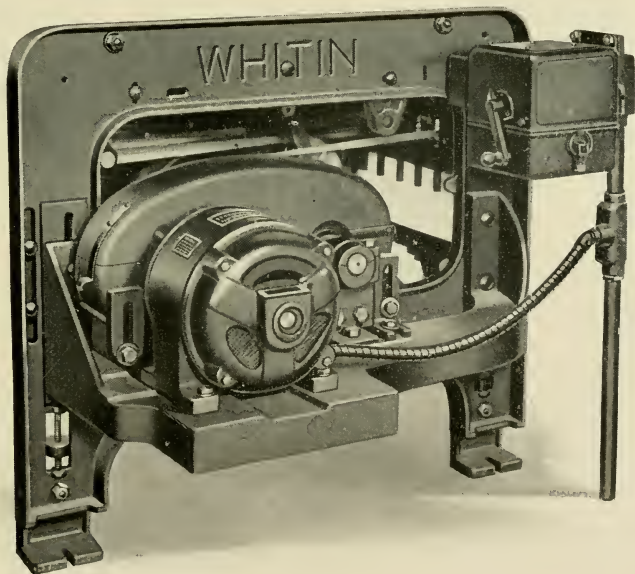


**Birkenhead Creel, designed for foreign trade.**

**The Cylinders** are substantially made, 7" or 8" diameter, in short lengths of best grade of material, and are well balanced for high speeds. Where spindle whirles are larger than  $\frac{7}{8}$ " diameter we would advise the use of an 8" diameter cylinder, provided, however, that the required spindle speed does not necessitate abnormal speed and sizes of countershaft pulleys

For standard equipment the cylinder journals run in self-oiling plain bearing, but if desired either ball or roller bearings may be had instead. By our improved setting of the boxes, the cylinders may be taken from the frame for repairs, and put back again without any readjustment. The support of the outside end of the pulley arbor serves also as a guard for the pulley and belt.

**The Driving pulleys**, varying in size from 9" diameter to 22" diameter by 2" to 4" face, are placed on the foot end of the frame, unless ordered to be fitted on the geared end. The loose pulley runs on a sleeve, which is integral with the yoke box, supporting the pulley arbor. When the belt is on the tight pulley, the loose pulley does not revolve. The frame is equipped with a novel, **patented device** that furnishes sufficient tension to the belt shipping mechanism to prevent the belt from creeping from the tight pulley onto loose pulley, or vice versa, and thereby stopping or starting the frame when such change is not desired. Liability of accident to



Geared Motor Drive

an operator while changing the gearing, by the unexpected starting of the frame, is avoided by the use of a locking device applied to the belt shipping mechanism.

If desired, the frames may be built to be driven by an Electric Motor, either by direct connection with the cylinder arbor, or by gearing to the same.

**Horse Power.** The power consumed by spinning frames depends on several varying factors, viz: the number of yarn, the weight and speed of the spindles, the length of the traverse, the diameter of the rings, the band pull, the lubrication, and the temperature and humidity of the room. Owing to these varying elements it is impossible to set up a standard that will answer all requirements.

### **Weights per foot in length:**

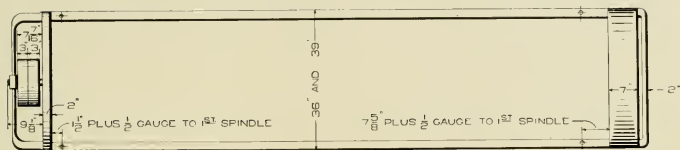
#### **Domestic:**

Net, 295 pounds,  
Gross, 319 pounds.

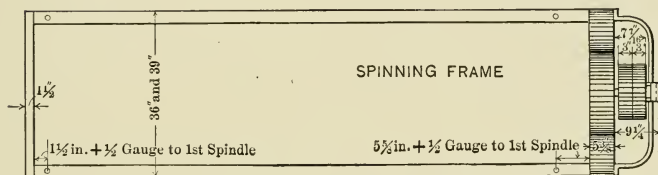
#### **Export:**

Gross, 359 pounds  
Cubic Feet, 7.8.

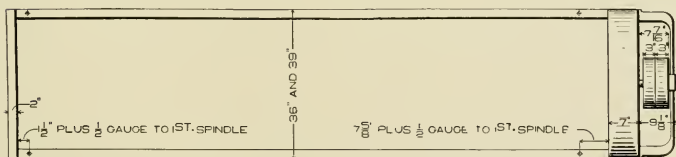
# FLOOR PLANS OF SPINNING FRAMES



**Model B, Tape Drive Spindles or Model C, Band Drive Spindles**  
**Foot End Drive**



**Model A, Band Drive Spindles**  
**Head End Drive**



**Model B, Tape Drive Spindles for Model C, Band Drive Spindles.**  
**Head End Drive**

**Rule** for finding the overall lengths of Model B Frames: Number Spindles  $\div 2 \times$  gauge + 29 1/2 = length in inches of frame with 3 inch face pulleys.



# WHITIN SPINNING FRAMES

Floor Space:—Widths, 36 and 39 inches, and Lengths over all for Model C Band Drive Frames and Model B Tape Drive Frames, as follows:

Number of Spindles	4½ inch Space		4 inch Space		3½ inch Space		3½ inch Space		3 inch Space		2½ inch Space		2½ inch Space		Number of Spindles
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	
112	25	0	22	6	21	3	20	0	18	9	15	4	14	9	112
120															120
128	27	3	24	6	25	1	21	9	20	4	17	2	15	6	128
132	29	6	26	6	25	0	23	6	22	0	19	0	18	3	132
144	31	9	28	6	26	10	25	3	23	7	20	10	20	0	144
156	33	0	30	6	28	9	27	0	25	3	22	6	20	0	156
160															160
168	34	0	30	6	28	9	27	0	25	3	22	6	20	0	168
176															176
180	36	3	32	6	30	7	28	9	26	10	22	8	21	9	180
192	38	6	34	6	32	6	30	6	28	6	24	6	23	6	192
204	40	9	36	6	34	4	32	3	30	1	26	4	25	3	204
208															208
216	43	0	38	6	36	3	34	0	31	9	26	4	25	3	216
224															224
228			40	6	38	1	35	9	33	4	28	2	27	0	228
240			42	6	40	0	37	6	35	0	30	0	28	9	240
252					41	10	39	3	36	7	31	10	30	6	252
256															256
264					41	0	41	0	38	3	33	8	32	3	264
272					42										272
288						9			39	10	35	6	34	0	288
300									41	1	37	4	35	9	300
304									43						304
312															312
320															320
336															336
352															352

Above Lengths are for 3-inch Face Pulley:—3½-inch Face add 1 inch;—4-inch Face add 2 inches. When Belted on Head End subtract 2" from above Lengths. Model A Band Drive Spinning Frames are 6" shorter than Lengths given in above table



# FLOOR SPACE OF WHITIN SPINNING FRAMES WITH OUTBOARD END

Number of Spindles	2½" Space 6 Boss		2¾" Space 8 Boss		3" Space 6 Boss		3¼" Space 6 Boss		3½" Space 6 Boss		3¾" Space 6 Boss		4" Space 6 Boss		4¼" Space 4 Boss		4½" Space 4 Boss	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
112			14	11¾											22	6¾	23	8¾
120	15	2¾			16	5¾	17	8¾	18	11¾	20	2¾	21	5¾	22	8¾	23	11¾
128			16	8¾											25	4¾	26	8¾
132	16	5¾			17	10¾	19	2¾	20	7¾	21	11¾	23	4¾	24	8¾		
136															26	9¾	28	¾
144	17	8¾	18	5¾	19	2¾	20	8¾	22	2¾	23	8¾	25	2¾	26	8¾	28	2¾
152															29	7¾	31	2¾
156	18	11¾			20	7¾	22	2¾	23	10¾	25	5¾	27	1¾	28	8¾		
160			20	2¾											31	¾	32	8¾
168	20	2¾			21	1¾	23	8¾	25	5¾	27	2¾	28	11¾	30	8¾	32	5¾
176			21	11¾											33	10¾	35	8¾
180	21	5¾			22	9¾	25	2¾	27	1¾	28	11¾	30	10¾	32	8¾		
184															35	3¾	37	2¾
192	22	8¾	23	8¾	24	8¾	26	8¾	28	8¾	30	8¾	32	8¾	34	8¾	36	8¾
200															38	1¾	40	2¾
204	23	11¾			26	1¾	28	2¾	30	4¾	32	5¾	34	7¾	36	8¾		
208			25	5¾											39	6¾	41	8¾
216	25	2¾			27	5¾	29	8¾	31	11¾	34	2¾	36	5¾	38	8¾	40	11¾
224			27	2¾											42	4¾	43	7¾
228	26	5¾			28	10¾	31	2¾	33	7¾	35	11¾	38	4¾	40	8¾		
232															43	9¾	46	2¾
240	27	8¾	28	11¾	30	2¾	32	8¾	35	2¾	37	8¾	40	2¾	42	8¾	45	2¾
248															46	5¾	49	2¾
252	28	11¾			31	8¾	34	2¾	36	10¾	39	5¾	42	1¾	44	8¾		
256			30	8¾											48	¾	50	8¾
264	30	2¾			32	11¾	35	8¾	38	5¾	41	2¾	43	11¾	46	8¾	49	5¾
272			32	5¾											50	10¾	53	8¾
276	31	5¾			34	4¾	37	2¾	40	1¾	42	11¾	45	10¾	48	8¾		
280															52	3¾		
288	32	8¾	34	2¾	35	8¾	38	8¾	41	8¾	44	8¾	47	8¾	50	8¾	53	8¾
296																		
300	33	11¾			37	1¾	40	2¾	43	4¾	46	3¾	49	7¾	52	8¾		
304			35	11¾														
312	35	2¾			38	5¾	41	8¾	44	11¾	47	11¾	51	5¾	54	8¾		
320			37	8¾														
324	36	5¾			39	10¾	43	2¾	46	7¾	49	11¾	53	4¾				
336	37	8¾	39	5¾	41	2¾	44	8¾	48	2¾	51	8¾						
348	38	11¾			42	7¾	46	2¾	49	10¾	53	5¾						
352			41	2¾														
360	40	2¾			43	11¾	47	8¾	51	5¾								
368			42	11¾														
372	41	5¾			45	4¾	49	2¾	53	1¾								
384	42	8¾	44	8¾	46	8¾												
396	43	11¾			48	1¾	52	2¾										
400			46	5¾														
408	45	2¾			49	5¾	53	8¾										
416			48	2¾														
420	46	5¾			50	10¾												
432	47	8¾	49	11¾	52	2¾												
444	48	11¾			53	7¾												
448			51	8¾														
456	50	2¾																
464			53	5¾														
468	51	5¾																
480	52	8¾	53	2¾														
492	53	11¾																
496			56	11¾														
504	55	2¾																
512			58	8¾														

# BAND DRIVE SPINNING

## Speed Table

Giving Revolutions per Minute of 7 inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 7 inch Cylinder with							
	$\frac{3}{4}$ inch Whirl Ratio 8.33	$\frac{11}{16}$ inch Whirl Ratio 7.68	$\frac{1}{2}$ inch Whirl Ratio 7.25	$\frac{13}{16}$ inch Whirl Ratio 6.62	1 inch Whirl Ratio 6.24	$1\frac{1}{16}$ inch Whirl Ratio 5.86	$1\frac{1}{8}$ inch Whirl Ratio 5.43	$1\frac{1}{4}$ inch Whirl Ratio 4.80
4000						683	737	833
4100						700	755	854
4200						717	773	875
4300						734	792	896
4400						751	810	917
4500					721	768	829	938
4600					737	785	847	958
4700					753	802	866	979
4800					769	819	884	1000
4900					781	836	902	1021
5000				755	801	853	921	1042
5100				770	817	870	939	1063
5200				785	833	887	957	1083
5300				801	849	904	976	1104
5400				816	865	921	994	1125
5500			759	831	881	938	1013	1146
5600			772	846	897	956	1031	1167
5700			786	861	913	973	1050	1188
5800			*800	876	929	990	1068	1208
5900			814	891	946	1007	1087	1224
6000		781	828	906	962	1024	1105	1250
6100		794	841	921	978	1041	1123	1271
6200		807	855	936	994	1058	1142	1292
6300		820	869	952	1010	1075	1160	1313
6400		833	883	967	1026	1092	1179	1333
6500	780	846	897	982	1042	1109	1197	1354
6600	792	859	910	997	1058	1126	1215	1375
6700	804	872	924	1012	1074	1143	1234	1396
6800	816	885	938	1027	1090	1160	1252	1417
6900	828	898	952	1042	1106	1177	1271	1438
7000	840	911	966	1057	1122	1195	1289	1459
7100	852	924	979	1072	1138	1212	1308	1470
7200	864	937	993	1088	1154	1229	1326	1491
7300	876	950	1007	1103	1170	1246	1344	1512
7400	888	963	1021	1118	1186	1263	1363	1533
7500	900	976	1034	1133	1202	1280	1381	
7600	912	989	1048	1148	1218	1297	1400	
7700	924	1002	1062	1163	1234	1314	1418	
7800	936	1015	1076	1178	1250	1331	1436	
7900	948	1028	1090	1193	1266	1348	1455	

# BAND DRIVE SPINNING

## Speed Table

Giving Revolutions per Minute of 7 inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 7 inch Cylinder with						
	$\frac{3}{8}$ inch Whirl Ratio 8.33	$\frac{13}{16}$ inch Whirl Ratio 7.68	$\frac{1}{2}$ inch Whirl Ratio 7.25	$\frac{15}{16}$ inch Whirl Ratio 6.62	1 inch Whirl Ratio 6.24	$1\frac{1}{16}$ inch Whirl Ratio 5.86	$1\frac{1}{8}$ inch Whirl Ratio 5.43
8000	960	1041	1103	1208	1282	1365	
8100	972	1054	1117	1223	1298	1382	1473
8200	984	1067	1131	1239	1314	1399	1491
8300	996	1080	1145	1254	1330	1416	1509
8400	1008	1093	1159	1269	1346	1433	1527
8500	1020	1106	1172	1284	1362	1450	1545
8600	1032	1119	1186	1299	1378	1467	
8700	1044	1132	1200	1314	1394	1484	
8800	1056	1145	1214	1329	1410	1501	
8900	1068	1158	1228	1344	1426	1518	
9000	1080	1171	1241	1360	1442		
9100	1092	1184	1255	1375	1458		
9200	1104	1197	1269	1390	1474		
9300	1116	1210	1283	1405	1490		
9400	1128	1223	1297	1420	1506		
9500	1140	1236	1310	1435			
9600	1152	1249	1324	1450			
9700	1164	1262	1338	1465			
9800	1176	1275	1352	1480			
9900	1188	1288	1366	1495			
10000	1200	1301	1379				
10100	1212	1314	1393				
10200	1224	1327	1407				
10300	1236	1340	1421				
10400	1248	1353	1435				
10500	1260	1366	1449				
10600	1272	1379	1463				
10700	1284	1392	1477				
10800	1296	1405	1491				
10900	1308	1418	1505				
11000	1320	1431					
11100	1332	1444					
11200	1344	1457					
11300	1356	1470					
11400	1368	1483					
11500	1380						
11600	1392						
11700	1404						
11800	1416						
11900	1428						
12000	1440						

# BAND DRIVE SPINNING

## Speed Table

Giving Revolutions per Minute of 8 inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 8 inch Cylinder with							
	$\frac{3}{16}$ inch Whirl Ratio 9.52	$\frac{1}{8}$ inch Whirl Ratio 8.91	$\frac{7}{16}$ inch Whirl Ratio 8.28	$\frac{1}{2}$ inch Whirl Ratio 7.67	1 inch Whirl Ratio 7.08	$1\frac{1}{16}$ inch Whirl Ratio 6.80	$1\frac{1}{8}$ inch Whirl Ratio 6.22	$1\frac{1}{4}$ inch Whirl Ratio 5.48
4000						588	643	730
4100						603	659	748
4200						618	675	766
4300						632	691	785
4400						647	707	803
4500					636	662	723	821
4600					650	676	740	840
4700					664	691	756	858
4800					678	706	772	876
4900					692	721	788	894
5000				652	706	735	804	912
5100				665	720	750	820	930
5200				678	734	765	836	949
5300				691	749	779	852	967
5400				704	761	794	868	985
5500			664	717	777	809	884	1004
5600			676	730	791	824	900	1022
5700			688	743	805	838	916	1040
5800			700	756	819	853	932	1058
5900			712	769	833	868	949	1077
6000		673	725	782	847	882	965	1095
6100		684	737	795	862	897	981	1113
6200		695	748	808	876	912	997	1131
6300		706	761	821	890	926	1013	1150
6400		717	773	834	904	941	1029	1168
6500	683	728	785	847	918	956	1045	1186
6600	693	739	797	860	932	971	1061	1205
6700	704	750	809	874	946	985	1077	1223
6800	714	761	821	887	961	1000	1093	1241
6900	724	772	833	900	975	1014	1109	1259
7000	734	783	845	913	989	1029	1125	1277
7100	744	794	857	926	1003	1044	1141	1296
7200	754	805	870	939	1017	1059	1158	1314
7300	764	816	882	952	1031	1074	1172	1332
7400	774	827	894	965	1045	1088	1190	1350
7500	784	838	906	978	1059	1103	1206	1369
7600	794	849	918	991	1073	1118	1222	1387
7700	804	860	930	1004	1088	1132	1238	1405
7800	814	871	942	1017	1102	1147	1254	1423
7900	824	882	954	1030	1116	1162	1270	1442

# BAND DRIVE SPINNING

## Speed Table

Giving Revolutions per Minute of 8 Inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 8 inch Cylinder with						
	$\frac{3}{4}$ inch Whirl Ratio 9.52	$\frac{11}{16}$ inch Whirl Ratio 8.91	$\frac{7}{8}$ inch Whirl Ratio 8.28	$\frac{15}{16}$ inch Whirl Ratio 7.67	1 inch Whirl Ratio 7.08	$1\frac{1}{16}$ inch Whirl Ratio 6.80	$1\frac{1}{8}$ inch Whirl Ratio 6.22
8000	840	898	966	1043	1130	1176	1286
8100	851	909	978	1056	1144	1191	1302
8200	862	921	990	1069	1158	1206	1318
8300	872	932	1002	1082	1172	1221	1334
8400	882	943	1014	1095	1186	1235	1350
8500	893	954	1027	1108	1201	1250	1367
8600	904	965	1039	1121	1215	1265	1383
8700	915	976	1051	1134	1229	1279	1399
8800	925	988	1063	1147	1243	1294	1415
8900	935	999	1075	1160	1257	1309	1431
9000	945	1010	1087	1173	1271	1324	
9100	956	1021	1099	1186	1285	1338	
9200	966	1032	1111	1199	1299	1353	
9300	977	1044	1123	1213	1314	1368	
9400	988	1055	1135	1226	1328	1382	
9500	998	1066	1147	1239	1342		
9600	1009	1077	1159	1252	1356		
9700	1019	1088	1171	1265	1370		
9800	1029	1100	1183	1278	1384		
9900	1040	1111	1195	1291	1398		
10000	1050	1122	1208	1304			
10100	1061	1133	1220	1317			
10200	1071	1144	1232	1330			
10300	1082	1156	1244	1343			
10400	1092	1167	1256	1356			
10500	1103	1178	1268				
10600	1113	1189	1280				
10700	1124	1200	1292				
10800	1134	1212	1304				
10900	1144	1223	1316				
11000	1155	1235					
11100	1166	1246					
11200	1176	1257					
11300	1187	1269					
11400	1197	1280					
11500	1208						
11600	1219						
11700	1229						
11800	1240						
11900	1250						
12000	1261						

# TAPE DRIVE SPINNING

## SPEED TABLE

Giving Revolutions per Minute of Cylinder Required to Produce Various  
 8 inch Cylinder Spindle Speeds 7 inch Cylinder

R. P. M. OF SPINDLES	Revolutions per Minute of Cylinder with						Revolutions per Minute of Cylinder with					
	$\frac{3}{8}$ inch Whirl Ratio 8.8	$\frac{1}{2}$ inch Whirl Ratio 8.3	1 inch Whirl Ratio 7.8	$1\frac{1}{8}$ inch Whirl Ratio 7.3	$1\frac{1}{4}$ inch Whirl Ratio 7	$1\frac{1}{2}$ inch Whirl Ratio 5.9	$\frac{3}{8}$ inch Whirl Ratio 7.8	$\frac{1}{2}$ inch Whirl Ratio 7.27	1 inch Whirl Ratio 6.81	$1\frac{1}{8}$ inch Whirl Ratio 6.43	$1\frac{1}{4}$ inch Whirl Ratio 6.09	$1\frac{1}{2}$ inch Whirl Ratio 5.22
4000	...	...	...	548	511	678	...	...	...	622	657	766
4100	...	...	...	561	586	695	...	...	...	637	674	785
4200	...	...	...	575	600	711	...	...	...	653	690	804
4300	...	...	...	589	614	728	...	...	...	668	706	823
4400	...	...	...	603	628	745	...	...	...	684	722	842
4500	...	...	577	616	643	762	...	...	661	699	739	861
4600	...	...	590	630	657	779	...	...	676	715	756	881
4700	...	...	602	644	671	796	...	...	691	731	773	900
4800	...	...	615	657	686	812	...	...	704	746	788	919
4900	...	...	628	671	700	830	...	...	720	762	804	938
5000	...	602	641	685	714	847	...	688	735	777	821	957
5100	...	614	654	698	728	864	...	701	750	792	838	976
5200	...	627	667	712	742	881	...	715	765	808	854	996
5300	...	639	680	726	757	898	...	729	779	824	871	1015
5400	...	651	692	740	771	915	...	742	794	840	888	1034
5500	625	662	704	753	785	932	705	756	809	855	904	1053
5600	636	674	718	767	800	949	718	770	824	871	920	1071
5700	648	687	730	781	814	966	730	784	838	886	937	1091
5800	659	698	743	794	828	983	743	798	852	902	953	1111
5900	670	710	756	806	842	1000	756	811	867	917	970	1121
6000	682	723	769	821	857	1017	769	825	882	932	986	1145
6100	693	734	782	836	871	1034	782	839	897	948	1002	1164
6200	704	746	794	849	885	1050	795	852	911	964	1019	1184
6300	716	759	808	863	900	1067	808	866	926	980	1035	1204
6400	728	770	820	876	914	1084	820	880	941	995	1052	1223
6500	739	783	833	890	928	1101	833	893	955	1011	1069	1243
6600	750	795	846	903	943	1118	846	906	970	1024	1083	1262
6700	761	807	859	918	957	1135	858	921	985	1041	1100	1282
6800	773	819	872	931	971	1152	872	934	1000	1055	1117	1301
6900	784	831	885	945	986	1169	884	947	1014	1072	1134	1321
7000	795	843	897	959	1000	1186	897	962	1029	1085	1150	1341
7100	806	855	910	972	1014	1203	910	975	1044	1103	1167	1360
7200	817	867	922	986	1028	1220	922	990	1058	1116	1184	1375
7300	828	879	936	1000	1043	1237	935	1002	1073	1133	1200	1394
7400	841	891	949	1013	1057	1254	948	1016	1088	1150	1216	1414
7500	852	903	961	1025	1071	1271	961	1031	1103	1164	1233	
7600	864	916	974	1040	1085	1288	974	1044	1117	1181	1249	
7700	875	928	987	1054	1100	1305	987	1057	1132	1195	1266	
7800	886	940	1000	1066	1114	1322	1000	1072	1147	1212	1283	
7900	898	952	1013	1082	1128	1339	1013	1085	1162	1226	1299	

# TAPE DRIVE SPINNING

## SPEED TABLE

Giving Revolutions per Minute of Cylinder Required to Produce Various  
8 inch Cylinder                      Spindle Speeds                      7 inch Cylinder

R. P. M. OF SPINDLES	Revolutions per Minute of Cylinder with						Revolutions per Minute of Cylinder with					
	$\frac{3}{8}$ inch Whirl Ratio 8.8	$\frac{4}{8}$ inch Whirl Ratio 8.3	1 inch Whirl Ratio 7.8	$1\frac{1}{8}$ inch Whirl Ratio 7.3	$1\frac{3}{8}$ inch Whirl Ratio 7	$1\frac{5}{8}$ inch Whirl Ratio 5.9	$\frac{3}{8}$ inch Whirl Ratio 7.8	$\frac{4}{8}$ inch Whirl Ratio 7.27	1 inch Whirl Ratio 6.81	$1\frac{1}{8}$ inch Whirl Ratio 6.43	$1\frac{3}{8}$ inch Whirl Ratio 6.09	$1\frac{5}{8}$ inch Whirl Ratio 5.22
8000	908	964	1026	1096	1142		1026	1100	1176	1242	1316	
8100	920	976	1038	1110	1157		1038	1113	1191	1256	1333	
8200	932	988	1051	1123	1171		1051	1126	1206	1273	1349	
8300	943	1000	1064	1137	1185		1064	1141	1220	1290	1364	
8400	954	1012	1076	1151	1200		1077	1154	1235	1304	1381	
8500	966	1024	1089	1164	1214		1090	1167	1250	1321		
8600	977	1036	1102	1178	1228		1102	1182	1264	1335		
8700	989	1048	1115	1192	1243		1115	1195	1279	1352		
8800	1000	1060	1128	1204	1257		1128	1210	1294	1365		
8900	1010	1072	1141	1219	1271		1141	1223	1309	1382		
9000	1022	1084	1154	1233			1154	1236	1323			
9100	1034	1096	1167	1247			1167	1251	1338			
9200	1045	1108	1179	1260			1179	1264	1353			
9300	1057	1120	1192	1274			1192	1276	1367			
9400	1068	1132	1205	1288			1205	1292	1382			
9500	1078	1144	1218				1218	1304				
9600	1091	1156	1231				1231	1320				
9700	1102	1169	1243				1243	1333				
9800	1114	1181	1256				1256	1346				
9900	1125	1193	1269				1269	1361				
10000	1136	1204					1282					
10100	1147	1216					1295					
10200	1159	1227					1308					
10300	1170	1241					1320					
10400	1182	1253					1333					
10500	1193						1346					
10600	1204						1359					
10700	1215						1372					
10800	1227						1384					
10900	1238						1397					
11000	1250											
11100	1261											
11200	1272											
11300	1284											
11400	1295											



# Traveller Table

## For Whitin Ring Spinning Frames with Separators.

Warp Yarn.					Filling Yarn.				
Number of Yarn.	Revolutions of Spindles.	Diameter of Ring.	Number of Traveller.	Weight of 10 Travellers in grains.	Number of Yarn.	Revolutions of Spindles.	Diameter of Ring.	Number of Traveller.	Weight of 10 Travellers in grains.
4	4950	2"	14	39	4	4000	1½"	16	44
6	5900		12	33	6	4800		13	36
8	6700		9	23	8	5450		10	26
10	7250		8	20	10	5950		8	20
11	7500		7	18	11	6150		7	18
12	7750		6	16	12	6350		6	16
13	7950		6	16	13	6500		5	14
14	8100		5	14	14	6700		4	13
15	8300		4	13	15	6850		3	12
16	8450		3	12	16	6950		2	11
17	8600		2	11	17	7100		1	10
18	8750		1	10	18	7200		1-0	9
19	8850		1-0	9	19	7300		3-0	8
20	8900		2-0	8½	20	7400		5-0	7
21	9050		3-0	8	21	7500		5-0	
22	9100		4-0	7½	22	7600		6-0	6½
23	9150		5-0	7	23	7700		6-0	
24	9200		6-0	6½	24	7800	1¾"	7-0	6
28	9500	1¾"	7-0	6	28	7900		8-0	5½
32	9500		8-0	5½	32	7900		9-0	5
34	9600		9-0	5	34	7900		10-0	4½
36	9700		10-0	4½	36	7900		11-0	4
38	9800		11-0	4	38	7900		12-0	3¾
40	9700		12-0	3¾	40	7900		13-0	3½
45	9700		13-0	3½	45	7900		14-0	3¼
50	9700		14-0	3¼	50	7900		15-0	3
55	9600		14-0		55	7900		15-0	
60	9600		15-0	3	60	7900		16-0	2¾
65	9600		15-0		65	7800		16-0	
70	9500		16-0	2¾	70	7800		17-0	2½
75	9500		16-0		75	7800		17-0	
80	9300		17-0	2½	80	7700		18-0	2¼
85	9100		17-0		85	7600		18-0	
90	9100	1⅝"	18-0	2¼	90	7400		19-0	2
95	9000		19-0	2	95	7400		20-0	1¾
100	8700		20-0	1¾	100	7200		21-0	1½
110	8500		21-0	1½	110	6900		22-0	1¼

Sizes of Travellers will vary from the above table according to variations in speed, quality of cotton, etc., but the table may serve as a basis to select from. The higher the speed the lighter the traveller and vice versa, varying in proportion of one or two grades of travellers to each 1000 revolutions of spindle. Without separators a few grades heavier traveller would be required.



## RULES FOR SPINNERS.

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*One pound is 7000 grains.*

*One lea is 120 yards long.*

*One hank is 840 yards long.*

*The number of the yarn is the number of hanks in one pound.*

*The hank roving divided by the doublings, and multiplied by the draught, equals the number of yarn.*

*To find hank roving from number of grains per yard:*

Dividing 8.33 by the number of grains per yard, equals hank roving.

*To find speed of front roll:*

Divide revolutions per minute of spindle by the product of the twist per inch, multiplied by the circumference in inches of the front roll.

*To find speed of spindles:*

Multiply the revolutions of the cylinder by the ratio of speeds of the cylinder and spindle.

*Method of finding the cylinder and spindle ratio:*

On the foot end of the frame in which it is desired to find the speed ratio, mark with chalk coinciding points on both cylinder and frame. Also mark points in a like manner on the spindle whirl and frame adjacent thereto. Then slowly revolve the cylinder until the chalk marks on both the cylinder and spindle simultaneously coincide with their respective frame marks. With the aid of an assistant, the number of turns of both cylinder and spindle should be carefully taken. The turns of the spindle divided by the turns of the cylinder gives the ratio desired. To render the result as accurate as possible, the spindle should be driven by a band of a size and tension the same as is used under ordinary working conditions.

*To find the standard twist per inch:*

Multiply the square root of the number of yarn by —

4.75	for	Frame Warp Yarns
4.	for	Extra Mule Warp Yarns
3.50	for	Frame Filling Yarns
3.25	for	Mule Filling Yarns
2.75	for	Doubling Yarns
2.50	for	Mule Hosiery Yarns
3.	for	frame “ “

*Example.*—What is the twist per inch of 25s frame warp yarn?

*Answer.*—The square root of 25 is 5; therefore,  $5 \times 4.75 = 23.75$  turns per inch.

*To find the draught:*

Counts divided by hank roving equals the draught.

*Example.*— $24s \div 3 \text{ hank} = 8 \text{ draught}$ .

*To find hank roving:*

Counts divided by draught equals hank roving.

*Example.*— $24s \text{ divided by } 8 \text{ draught} = 3 \text{ hank roving}$ .

*To find the counts:*

Multiply length of yarn in yards by 8.33 and divide by weight in grains equals counts.

*To find what per cent. yarn contracts in twisting:*

Divide the number of yarn by the product of the draught and hank roving and subtract the quotient from 1.

*Example.*—No. 20s yarn is being spun from 3 hank roving with a draught of 6.87; then  $6.87 \times 3 = 20.61$ ;  $20 \div 20.61 = .97$ ; therefore,  $1 - .97 = .03$  or 3%.

*To find the draught in machine:*

The product of the back roll gear, crown gear, and diameter in inches of the front roll, divided by the product of the front roll gear and diameter of the back roll equals the draught constant. Constant divided by change gear equals draught.

*Example.*—84 teeth back roll gear, 168 teeth crown gear, 1" diameter of front roll, 30 teeth front roll gear,  $\frac{7}{8}$ " diameter back roll; what is the draught constant?

$$\frac{84 \times 168 \times 1}{30 \times \frac{7}{8}} = 537.60 = \text{Draught constant.}$$

*To find what change draught gear will be required when changing from one number of yarn to another, without changing the roving:*

Multiply the number of teeth in the change draught gear in use by the number of yarn spun. Dividing this product by the number of yarn desired will give the required change draught gear.

*Example.*—What change draught gear will be required to change from 24s yarn, spun from 3 hank roving using a 32 teeth change draught gear to 20s yarn?

$$32 \times 24 = 768; 768 \div 20 = 38 \text{ teeth change draught gear required.}$$

*To find what change draught gear will be required when changing from one number of yarn to another, the draught and roving both being changed:*

Multiply the number of yarn being spun by the new hank roving and this product by the number of teeth in the change draught gear being used; divide this product by the number of yarn desired, multiplied by the hank roving being used. The quotient is the change draught gear required.

*Example.*—What change draught gear will be required to change from 24s yarn spun from 3 hank roving using a 32 teeth change draught gear to 20s yarn from 2.75 hank roving?

$24 \times 2.75 \times 32 = 2112$ ;  $20 \times 3 = 60$ ; therefore,  $2112 \div 60 = 35$  teeth change draught gear required.

*To find the twist per inch in machine:*

The product of the front roll gear, the stud gear, and the ratio of the spindle to the cylinder, divided by the product of the cylinder gear, and the circumference in inches of the front roll, equals the twist constant. Constant divided by change gear equals twist per inch.

*Example.*—108 teeth front roll gear, 88 teeth stud gear, 8.33 ratio of  $\frac{3}{4}$ " whirl to 7" cylinder, 22 teeth cylinder gear,  $1" \times \frac{2.2}{7} =$  circ. front roll; twist constant required?

$$\frac{108 \times 88 \times 7 \times 8.33}{22 \times 1" \times 22} = 1144.99 = \text{Twist Constant.}$$

*To find what change twist gear will be required when changing from one number of yarn to another:*

Square the number of teeth in the change twist gear being used, and multiply by the number of yarn being spun. Divide the product by the number of yarn desired; the square root of the quotient will be the number of teeth in the change gear required.

*Example.*—What change twist gear will be required to change from 24s warp yarn, now using a 25 teeth change twist gear to 20s warp yarn?

$25^2 = 625$ ;  $625 \times 24 = 15000$ ;  $15000 \div 20 = 750$ ;  $\sqrt{750} = 27$  teeth, change twist gear required.

*To find the hanks per spindle per day:*

Divide the product of the circumference of the front roll, the number of revolutions per minute of the front roll, the number of minutes per hour and the hours per day by the product of the number of inches in one yard and the number of yards in one hank. The resulting quotient is the number of hanks per day per spindle without an allowance being made for stoppages, due to doffing, cleaning and oiling. The usual allowances for the different numbers of yarn may be noted by reference to Production Tables on Ring Spinning.

*Example.*—How many hanks of number 20s warp yarn per spindle per 10 hours will be produced by a frame with 1 inch front roll running 100 revolutions per minute?

$$\text{Answer} - \frac{1 \times 3.1416 \times 100 \times 60 \times 10 \times .90}{36 \times 840} = 5.61 \text{ hanks.}$$

*To find the pounds per spindle per day:*

Divide the number of hanks produced per spindle per day by the number of yarn.

*Example.*—Taking the above problem,  
 $5.61 \text{ hanks} \div 20 = .28 \text{ pounds of 20s warp per day per spindle.}$

### Sizes of Spinning Ring Flanges

No. 1	flange is $\frac{4}{32}$ inch wide	No. 5	flange is $\frac{8}{32}$ inch wide
" 2	" " $\frac{5}{32}$ " "	" 6	" " $\frac{9}{32}$ " "
" $2\frac{1}{2}$	" " $\frac{11}{64}$ " "	" 7	" " $\frac{10}{32}$ " "
" 3	" " $\frac{6}{32}$ " "	" 8	" " $\frac{11}{32}$ " "
" 4	" " $\frac{7}{32}$ " "	" 9	" " $\frac{12}{32}$ " "

No. 10 flange is  $\frac{13}{32}$  inch wide

Weight of yarn on bobbins:

$2\frac{1}{2}$ "	diameter ring,	7"	traverse,	3.876	oz. of cotton
$2\frac{1}{4}$ "	"	"	7"	3.325	" "
2 "	"	"	6"	2.8	" "
$1\frac{3}{4}$ "	"	"	6"	2.00	" "
$1\frac{5}{8}$ "	"	"	5"	1.30	" "
$1\frac{1}{2}$ "	"	"	5"	1.25	" "

# TABLE FOR NUMBERING COTTON YARN

By the Weight in Grains of 120 Yards or One Skein

120 yds. weigh grains.	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn
1.	1000.	13.	76.92	19.	52.63	25.	40.00	31.	32.26
2.	500.	.1	76.34	.1	52.36	.1	39.84	.1	32.16
3.	333.3	.2	75.76	.2	52.08	.2	39.68	.2	32.05
4.	250.0	.3	75.19	.3	51.81	.3	39.53	.3	31.95
5.	200.0	.4	74.63	.4	51.55	.4	39.37	.4	31.85
5.5	181.8	.5	74.07	.5	51.28	.5	39.22	.5	31.75
6.	166.7	.6	73.53	.6	51.02	.6	39.06	.6	31.65
6.5	153.8	.7	72.99	.7	50.76	.7	38.91	.7	31.55
7.	142.9	.8	72.46	.8	50.51	.8	38.76	.8	31.45
7.5	133.3	.9	71.94	.9	50.25	.9	38.61	.9	31.35
8.	125.0	14.	71.43	20.	50.00	26.	38.46	32.	31.25
.1	123.5	.1	70.92	.1	49.75	.1	38.31	.1	31.15
.2	122.0	.2	70.42	.2	49.50	.2	38.17	.2	31.06
.3	120.5	.3	69.93	.3	49.26	.3	38.02	.3	30.96
.4	119.0	.4	69.44	.4	49.02	.4	37.88	.4	30.86
.5	117.6	.5	68.97	.5	48.78	.5	37.74	.5	30.77
.6	116.3	.6	68.49	.6	48.54	.6	37.59	.6	30.67
.7	114.9	.7	68.03	.7	48.31	.7	37.45	.7	30.58
.8	113.6	.8	67.57	.8	48.08	.8	37.31	.8	30.49
.9	112.4	.9	67.11	.9	47.85	.9	37.17	.9	30.40
9.	111.1	15.	66.67	21.	47.62	27.	37.04	33.	30.30
.1	109.9	.1	66.23	.1	47.39	.1	36.90	.1	30.21
.2	108.7	.2	65.79	.2	47.17	.2	36.77	.2	30.12
.3	107.5	.3	65.36	.3	46.95	.3	36.63	.3	30.03
.4	106.4	.4	64.94	.4	46.73	.4	36.50	.4	29.94
.5	105.3	.5	64.52	.5	46.51	.5	36.36	.5	29.85
.6	104.2	.6	64.10	.6	46.30	.6	36.23	.6	29.76
.7	103.1	.7	63.69	.7	46.08	.7	36.10	.7	29.67
.8	102.0	.8	63.29	.8	45.87	.8	35.97	.8	29.59
.9	101.0	.9	62.89	.9	45.66	.9	35.84	.9	29.50
10.	100.0	16.	62.50	22.	45.45	28.	35.71	34.	29.41
.1	99.01	.1	62.11	.1	45.25	.1	35.59	.1	29.33
.2	98.04	.2	61.73	.2	45.05	.2	35.46	.2	29.24
.3	97.09	.3	61.35	.3	44.84	.3	35.34	.3	29.15
.4	96.15	.4	60.98	.4	44.64	.4	35.21	.4	29.07
.5	95.24	.5	60.61	.5	44.44	.5	35.09	.5	28.99
.6	94.34	.6	60.24	.6	44.25	.6	34.97	.6	28.90
.7	93.46	.7	59.88	.7	44.05	.7	34.84	.7	28.82
.8	92.59	.8	59.52	.8	43.86	.8	34.72	.8	28.74
.9	91.74	.9	59.17	.9	43.67	.9	34.60	.9	28.65
11.	90.91	17.	58.82	23.	43.48	29.	34.48	35.	28.57
.1	90.09	.1	58.48	.1	43.29	.1	34.36	.1	28.49
.2	89.29	.2	58.14	.2	43.10	.2	34.25	.2	28.41
.3	88.50	.3	57.80	.3	42.92	.3	34.13	.3	28.33
.4	87.72	.4	57.47	.4	42.74	.4	34.01	.4	28.25
.5	86.96	.5	57.14	.5	42.55	.5	33.90	.5	28.17
.6	86.21	.6	56.82	.6	42.37	.6	33.78	.6	28.09
.7	85.47	.7	56.50	.7	42.19	.7	33.67	.7	28.01
.8	84.75	.8	56.18	.8	42.02	.8	33.56	.8	27.93
.9	84.03	.9	55.87	.9	41.84	.9	33.44	.9	27.86
12.	83.33	18.	55.56	24.	41.67	30.	33.33	36.	27.78
.1	82.64	.1	55.25	.1	41.49	.1	33.22	.1	27.70
.2	81.97	.2	54.95	.2	41.32	.2	33.11	.2	27.62
.3	81.30	.3	54.64	.3	41.15	.3	33.00	.3	27.55
.4	80.65	.4	54.35	.4	40.98	.4	32.89	.4	27.47
.5	80.00	.5	54.05	.5	40.82	.5	32.79	.5	27.40
.6	79.37	.6	53.76	.6	40.65	.6	32.68	.6	27.32
.7	78.74	.7	53.48	.7	40.49	.7	32.57	.7	27.25
.8	78.12	.8	53.19	.8	40.32	.8	32.47	.8	27.17
.9	77.52	.9	52.91	.9	40.16	.9	32.36	.9	27.10

# TABLE FOR NUMBERING COTTON YARN

By the Weight in Grains of 120 Yards or One Skein

120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn
37.	27.03	43.	23.26	49.	20.41	55.	18.18	61.	16.39
.1	26.95	.1	23.20	.1	20.37	.1	18.15	.1	16.37
.2	26.88	.2	23.15	.2	20.33	.2	18.12	.2	16.34
.3	26.81	.3	23.09	.3	20.28	.3	18.08	.3	16.31
.4	26.74	.4	23.04	.4	20.24	.4	18.05	.4	16.29
.5	26.67	.5	22.99	.5	20.20	.5	18.02	.5	16.26
.6	26.60	.6	22.94	.6	20.16	.6	17.99	.6	16.23
.7	26.53	.7	22.88	.7	20.12	.7	17.95	.7	16.21
.8	26.46	.8	22.83	.8	20.08	.8	17.92	.8	16.19
.9	26.39	.9	22.78	.9	20.04	.9	17.89	.9	16.16
38.	26.32	44.	22.73	50.	20.00	56.	17.86	62.	16.13
.1	26.25	.1	22.68	.1	19.96	.1	17.83	.1	16.10
.2	26.18	.2	22.62	.2	19.92	.2	17.79	.2	16.08
.3	26.11	.3	22.57	.3	19.88	.3	17.76	.3	16.05
.4	26.04	.4	22.52	.4	19.84	.4	17.73	.4	16.03
.5	25.97	.5	22.47	.5	19.80	.5	17.70	.5	16.00
.6	25.91	.6	22.42	.6	19.76	.6	17.67	.6	15.97
.7	25.84	.7	22.37	.7	19.72	.7	17.64	.7	15.95
.8	25.77	.8	22.32	.8	19.69	.8	17.61	.8	15.92
.9	25.71	.9	22.27	.9	19.65	.9	17.57	.9	15.90
39.	25.64	45.	22.22	51.	19.61	57.	17.54	63.	15.87
.1	25.58	.1	22.17	.1	19.57	.1	17.51	.1	15.85
.2	25.51	.2	22.12	.2	19.53	.2	17.48	.2	15.83
.3	25.45	.3	22.08	.3	19.49	.3	17.45	.3	15.80
.4	25.38	.4	22.03	.4	19.46	.4	17.42	.4	15.77
.5	25.32	.5	21.98	.5	19.42	.5	17.39	.5	15.75
.6	25.25	.6	21.93	.6	19.38	.6	17.36	.6	15.72
.7	25.19	.7	21.88	.7	19.34	.7	17.33	.7	15.70
.8	25.13	.8	21.83	.8	19.31	.8	17.30	.8	15.67
.9	25.06	.9	21.79	.9	19.27	.9	17.27	.9	15.65
40.	25.00	46.	21.74	52.	19.23	58.	17.24	64.	15.62
.1	24.94	.1	21.69	.1	19.19	.1	17.21	.1	15.60
.2	24.88	.2	21.65	.2	19.16	.2	17.18	.2	15.58
.3	24.81	.3	21.60	.3	19.12	.3	17.15	.3	15.55
.4	24.75	.4	21.55	.4	19.08	.4	17.12	.4	15.53
.5	24.69	.5	21.51	.5	19.05	.5	17.09	.5	15.50
.6	24.63	.6	21.46	.6	19.01	.6	17.06	.6	15.48
.7	24.57	.7	21.41	.7	18.98	.7	17.04	.7	15.46
.8	24.51	.8	21.37	.8	18.94	.8	17.01	.8	15.43
.9	24.45	.9	21.32	.9	18.90	.9	16.98	.9	15.41
41.	24.39	47.	21.28	53.	18.87	59.	16.95	65.	15.38
.1	24.33	.1	21.23	.1	18.83	.1	16.92	.1	15.36
.2	24.27	.2	21.19	.2	18.80	.2	16.89	.2	15.34
.3	24.21	.3	21.14	.3	18.76	.3	16.86	.3	15.31
.4	24.15	.4	21.10	.4	18.73	.4	16.84	.4	15.29
.5	24.10	.5	21.05	.5	18.69	.5	16.81	.5	15.27
.6	24.04	.6	21.01	.6	18.66	.6	16.78	.6	15.24
.7	23.98	.7	20.96	.7	18.62	.7	16.75	.7	15.22
.8	23.92	.8	20.92	.8	18.59	.8	16.72	.8	15.20
.9	23.87	.9	20.88	.9	18.55	.9	16.69	.9	15.17
42.	23.81	48.	20.83	54.	18.52	60.	16.67	66.	15.15
.1	23.75	.1	20.79	.1	18.48	.1	16.64	.1	15.13
.2	23.70	.2	20.75	.2	18.45	.2	16.61	.2	15.11
.3	23.64	.3	20.70	.3	18.42	.3	16.58	.3	15.08
.4	23.58	.4	20.66	.4	18.38	.4	16.56	.4	15.06
.5	23.53	.5	20.62	.5	18.35	.5	16.53	.5	15.04
.6	23.47	.6	20.57	.6	18.32	.6	16.50	.6	15.02
.7	23.42	.7	20.53	.7	18.28	.7	16.47	.7	14.99
.8	23.36	.8	20.49	.8	18.25	.8	16.45	.8	14.97
.9	23.31	.9	20.45	.9	18.21	.9	16.42	.9	14.95

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120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn
67.	14.93	73.	13.70	79.	12.66	85.	11.76	91.	10.99
.1	14.90	.1	13.68	.1	12.64	.1	11.75	.1	10.98
.2	14.88	.2	13.66	.2	12.63	.2	11.74	.2	10.96
.3	14.86	.3	13.64	.3	12.61	.3	11.72	.3	10.95
.4	14.84	.4	13.62	.4	12.59	.4	11.71	.4	10.94
.5	14.81	.5	13.61	.5	12.58	.5	11.70	.5	10.93
.6	14.79	.6	13.59	.6	12.56	.6	11.68	.6	10.92
.7	14.77	.7	13.57	.7	12.55	.7	11.67	.7	10.91
.8	14.75	.8	13.55	.8	12.53	.8	11.66	.8	10.89
.9	14.73	.9	13.53	.9	12.52	.9	11.64	.9	10.88
68.	14.71	74.	13.51	80.	12.50	86.	11.63	92.	10.87
.1	14.68	.1	13.50	.1	12.48	.1	11.61	.1	10.86
.2	14.66	.2	13.48	.2	12.47	.2	11.60	.2	10.85
.3	14.64	.3	13.46	.3	12.45	.3	11.59	.3	10.83
.4	14.62	.4	13.44	.4	12.44	.4	11.57	.4	10.82
.5	14.60	.5	13.42	.5	12.42	.5	11.56	.5	10.81
.6	14.58	.6	13.40	.6	12.41	.6	11.55	.6	10.80
.7	14.56	.7	13.39	.7	12.39	.7	11.53	.7	10.79
.8	14.53	.8	13.37	.8	12.38	.8	11.52	.8	10.78
.9	14.51	.9	13.35	.9	12.36	.9	11.51	.9	10.76
69.	14.49	75.	13.33	81.	12.35	87.	11.49	93.	10.75
.1	14.47	.1	13.32	.1	12.33	.1	11.48	.1	10.74
.2	14.45	.2	13.30	.2	12.32	.2	11.47	.2	10.73
.3	14.43	.3	13.28	.3	12.30	.3	11.45	.3	10.72
.4	14.41	.4	13.26	.4	12.29	.4	11.44	.4	10.71
.5	14.39	.5	13.25	.5	12.27	.5	11.43	.5	10.70
.6	14.37	.6	13.23	.6	12.25	.6	11.42	.6	10.68
.7	14.35	.7	13.21	.7	12.24	.7	11.40	.7	10.67
.8	14.33	.8	13.19	.8	12.22	.8	11.39	.8	10.66
.9	14.31	.9	13.18	.9	12.21	.9	11.38	.9	10.65
70.	14.29	76.	13.16	82.	12.20	88.	11.36	94.	10.64
.1	14.27	.1	13.14	.1	12.18	.1	11.35	.1	10.63
.2	14.25	.2	13.12	.2	12.17	.2	11.34	.2	10.62
.3	14.22	.3	13.11	.3	12.15	.3	11.33	.3	10.60
.4	14.20	.4	13.09	.4	12.14	.4	11.31	.4	10.59
.5	14.18	.5	13.07	.5	12.12	.5	11.30	.5	10.58
.6	14.16	.6	13.05	.6	12.11	.6	11.29	.6	10.57
.7	14.14	.7	13.04	.7	12.09	.7	11.27	.7	10.56
.8	14.12	.8	13.02	.8	12.08	.8	11.26	.8	10.55
.9	14.10	.9	13.00	.9	12.06	.9	11.25	.9	10.54
71.	14.08	77.	12.99	83.	12.05	89.	11.24	95.	10.53
.1	14.06	.1	12.97	.1	12.03	.1	11.22	.1	10.52
.2	14.04	.2	12.95	.2	12.02	.2	11.21	.2	10.50
.3	14.03	.3	12.94	.3	12.00	.3	11.20	.3	10.49
.4	14.01	.4	12.92	.4	11.99	.4	11.19	.4	10.48
.5	13.99	.5	12.90	.5	11.98	.5	11.17	.5	10.47
.6	13.97	.6	12.89	.6	11.96	.6	11.16	.6	10.46
.7	13.95	.7	12.87	.7	11.95	.7	11.15	.7	10.45
.8	13.93	.8	12.85	.8	11.93	.8	11.14	.8	10.44
.9	13.91	.9	12.84	.9	11.92	.9	11.12	.9	10.43
72.	13.89	78.	12.82	84.	11.90	90.	11.11	96.	10.42
.1	13.87	.1	12.80	.1	11.89	.1	11.10	.1	10.41
.2	13.85	.2	12.79	.2	11.88	.2	11.09	.2	10.40
.3	13.83	.3	12.77	.3	11.86	.3	11.07	.3	10.38
.4	13.81	.4	12.76	.4	11.85	.4	11.06	.4	10.37
.5	13.79	.5	12.74	.5	11.83	.5	11.05	.5	10.36
.6	13.77	.6	12.72	.6	11.82	.6	11.04	.6	10.35
.7	13.76	.7	12.71	.7	11.81	.7	11.03	.7	10.34
.8	13.74	.8	12.69	.8	11.79	.8	11.01	.8	10.33
.9	13.72	.9	12.67	.9	11.78	.9	11.00	.9	10.32



# TABLE FOR NUMBERING COTTON YARN

By the Weight in Grains of 120 Yards or One Skein

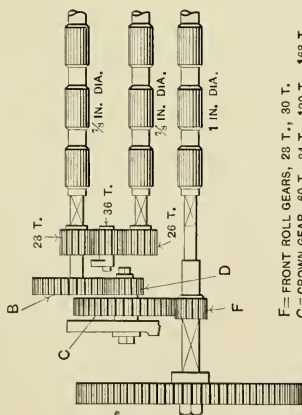
120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn
97.	10.31	103.	9.71	109.	9.17	121.	8.26	150.	6.67
.1	10.30	.1	9.70	.2	9.16	.4	8.24	.5	6.64
.2	10.29	.2	9.69	.4	9.14	.6	8.22	151.	6.62
.3	10.28	.3	9.68	.6	9.12	.8	8.21	.5	6.60
.6	10.27	.4	9.67	.8	9.11	122.	8.20	152.	6.58
.5	10.26	.5	9.66	110.	9.09	.5	8.16	.5	6.56
.6	10.25	.6	9.65	.2	9.07	123.	8.13	153.	6.54
.7	10.24	.7	9.64	.4	9.06	.5	8.10	.5	6.51
.8	10.22	.8	9.63	.6	9.04	124.	8.06	154.	6.49
.9	10.21	.9	9.62	.8	9.03	.5	8.03	.5	6.47
98.	10.20	104.	9.62	111.	9.01	125.	8.00	155.	6.45
.1	10.19	.1	9.61	.2	8.99	.5	7.97	.5	6.43
.2	10.18	.2	9.60	.4	8.98	126.	7.94	156.	6.41
.3	10.17	.3	9.59	.6	8.96	.5	7.91	.5	6.39
.4	10.16	.4	9.58	.8	8.94	127.	7.87	157.	6.37
.5	10.15	.5	9.57	112.	8.93	.5	7.84	.5	6.35
.6	10.14	.6	9.56	.2	8.91	128.	7.81	158.	6.33
.7	10.13	.7	9.55	.4	8.90	.5	7.78	.5	6.31
.8	10.12	.8	9.54	.6	8.88	129.	7.75	159.	6.29
.9	10.11	.9	9.53	.8	8.87	.5	7.72	.5	6.27
99.	10.10	105.	9.52	113.	8.85	130.	7.69	160.	6.25
.1	10.09	.1	9.51	.2	8.83	.5	7.66	.5	6.23
.2	10.08	.2	9.51	.4	8.82	131.	7.63	161.	6.21
.3	10.07	.3	9.50	.6	8.80	.5	7.60	.5	6.19
.4	10.06	.4	9.49	.8	8.79	132.	7.58	162.	6.17
.5	10.05	.5	9.48	114.	8.77	.5	7.55	.5	6.15
.6	10.04	.6	9.47	.2	8.76	133.	7.52	163.	6.13
.7	10.03	.7	9.46	.4	8.74	.5	7.49	.5	6.12
.8	10.02	.8	9.45	.6	8.73	134.	7.46	164.	6.10
.9	10.01	.9	9.44	.8	8.71	.5	7.43	.5	6.08
100.	10.00	106.	9.43	115.	8.70	135.	7.41	165.	6.06
.1	9.99	.1	9.43	.2	8.68	.5	7.38	.5	6.04
.2	9.98	.2	9.42	.4	8.67	136.	7.35	166.	6.02
.3	9.97	.3	9.41	.6	8.65	.5	7.33	.5	6.01
.4	9.96	.4	9.40	.8	8.64	137.	7.30	167.	5.99
.5	9.95	.5	9.39	116.	8.62	.5	7.27	.5	5.97
.6	9.94	.6	9.38	.2	8.61	138.	7.25	168.	5.95
.7	9.93	.7	9.37	.4	8.59	.5	7.22	.5	5.93
.8	9.92	.8	9.36	.6	8.58	139.	7.19	169.	5.92
.9	9.91	.9	9.35	.8	8.56	.5	7.17	.5	5.90
101.	9.90	107.	9.35	117.	8.55	140.	7.14	170.	5.88
.1	9.89	.1	9.34	.2	8.53	.5	7.12	171.	5.85
.2	9.88	.2	9.33	.4	8.52	141.	7.09	172.	5.81
.3	9.87	.3	9.32	.6	8.50	.5	7.07	173.	5.78
.4	9.86	.4	9.31	.8	8.49	142.	7.04	174.	5.75
.5	9.85	.5	9.30	118.	8.47	.5	7.02	175.	5.71
.6	9.84	.6	9.29	.2	8.46	143.	6.99	176.	5.68
.7	9.83	.7	9.29	.4	8.45	.5	6.97	177.	5.65
.8	9.82	.8	9.28	.6	8.43	144.	6.94	178.	5.62
.9	9.81	.9	9.27	.8	8.42	.5	6.92	179.	5.59
102.	9.80	108.	9.26	119.	8.40	145.	6.90	180.	5.56
.1	9.79	.1	9.25	.2	8.39	.5	6.87	181.	5.52
.2	9.78	.2	9.24	.4	8.38	146.	6.85	182.	5.49
.3	9.77	.3	9.23	.6	8.36	.5	6.83	183.	5.46
.4	9.77	.4	9.23	.8	8.35	147.	6.80	184.	5.43
.5	9.76	.5	9.22	120.	8.33	.5	6.78	185.	5.41
.6	9.75	.6	9.21	.2	8.32	148.	6.76	186.	5.38
.7	9.74	.7	9.20	.4	8.31	.5	6.73	187.	5.35
.8	9.73	.8	9.19	.6	8.29	149.	6.71	188.	5.32
.9	9.72	.9	9.18	.8	8.28	.5	6.69	189.	5.29

# TABLE FOR NUMBERING COTTON YARN

By the Weight in Grains of 120 Yards, or One Skein

120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn	120 yds. weigh grains	Numb'r of Yarn
191.	5.26	230.	4.35	290.	3.45	370.	2.70	550.	1.82
191.	5.24	231.	4.33	292.	3.42	372.	2.69	555.	1.80
192.	5.21	232.	4.31	294.	3.40	374.	2.67	560.	1.79
193.	5.18	233.	4.29	296.	3.38	376.	2.66	565.	1.77
194.	5.15	234.	4.27	298.	3.36	378.	2.65	570.	1.75
195.	5.13	235.	4.26	300.	3.33	380.	2.63	575.	1.74
196.	5.10	236.	4.24	302.	3.31	382.	2.62	580.	1.72
197.	5.08	237.	4.22	304.	3.29	385.	2.60	585.	1.71
198.	5.05	238.	4.20	306.	3.27	390.	2.56	590.	1.69
199.	5.03	239.	4.18	308.	3.25	395.	2.53	595.	1.68
200.	5.00	240.	4.17	310.	3.23	400.	2.50	600.	1.67
201.	4.98	241.	4.15	312.	3.21	405.	2.47	610.	1.64
202.	4.95	242.	4.13	314.	3.18	410.	2.44	620.	1.61
203.	4.93	243.	4.12	316.	3.17	415.	2.41	630.	1.59
204.	4.90	244.	4.10	318.	3.14	420.	2.38	640.	1.56
205.	4.88	245.	4.08	320.	3.12	425.	2.35	650.	1.54
206.	4.85	246.	4.07	322.	3.11	430.	2.33	660.	1.52
207.	4.83	247.	4.05	324.	3.09	435.	2.30	670.	1.49
208.	4.81	248.	4.03	326.	3.07	440.	2.27	680.	1.47
209.	4.78	249.	4.02	328.	3.05	445.	2.25	690.	1.45
210.	4.76	250.	4.00	330.	3.03	450.	2.22	700.	1.43
211.	4.74	252.	3.97	332.	3.01	455.	2.20	710.	1.41
212.	4.72	254.	3.94	334.	2.99	460.	2.17	720.	1.39
213.	4.69	256.	3.91	336.	2.98	465.	2.15	730.	1.37
214.	4.67	258.	3.88	338.	2.96	470.	2.13	740.	1.35
215.	4.65	260.	3.85	340.	2.94	475.	2.11	750.	1.33
216.	4.63	262.	3.82	342.	2.92	480.	2.08	760.	1.32
217.	4.61	264.	3.79	344.	2.91	485.	2.06	770.	1.30
218.	4.59	266.	3.76	346.	2.89	490.	2.04	780.	1.28
219.	4.57	268.	3.73	348.	2.87	495.	2.02	790.	1.27
220.	4.55	270.	3.70	350.	2.86	500.	2.00	800.	1.25
221.	4.52	272.	3.68	352.	2.84	505.	1.98	820.	1.22
222.	4.50	274.	3.65	354.	2.82	510.	1.96	840.	1.19
223.	4.48	276.	3.62	356.	2.81	515.	1.94	860.	1.16
224.	4.46	278.	3.60	358.	2.79	520.	1.92	880.	1.14
225.	4.44	280.	3.57	360.	2.78	525.	1.90	900.	1.11
226.	4.42	282.	3.55	362.	2.76	530.	1.89	925.	1.08
227.	4.41	284.	3.52	364.	2.75	535.	1.87	950.	1.05
228.	4.39	286.	3.50	366.	2.73	540.	1.85	975.	1.03
229.	4.37	288.	3.47	368.	2.72	545.	1.83	1000.	1.00

## GEARING DIAGRAMS AND FORMULA FOR FIGURING DRAUGHT.



F= FRONT ROLL GEARS, 28 T., 30 T.

C=CROWN GEAR, 60 T.; 84 T.; 120 T., 168 T.

D = DRAUGHT GEAR, 26-60 T.

B=BACK ROLL GEAR 84 T.

1" = DIA. OF FRONT ROLL

1" DIA. OF FRONT ROLL  
875" DIA. OF BACK ROLL

673 — DIA. OF BACK ROLL

$$\frac{C \times B \times 1}{E \times D \times .97E} \quad \text{OR} \quad \frac{C \times B \times 8}{E \times D \times 7} = \text{DRAUGHT}$$

— x D x .875 F x D x 7

$$\frac{C \times B \times 1}{C \times B \times 8} \text{ OR } \frac{C \times B \times 8}{C \times B \times 8} = \text{DRAUGHT CONSTANT}$$

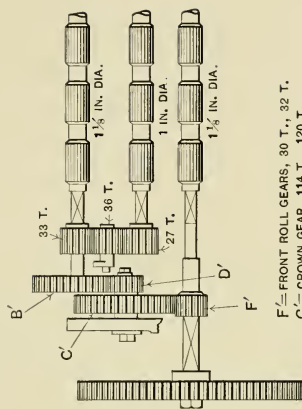
F x .875 F x 7

$$\frac{\text{DRAUGHT CONSTANT}}{\text{DRAUGHT GEAR}} =$$

DRAUGHT

DRAUGHT CONSTANT

DRAUGHT GEAR



$F' =$  FRONT ROLL GEARS, 30 T., 32 T.

C' = CROWN GEAR, 114 T., 120 T.

D' = DRAUGHT GEAR, 26 T. - 80 T.

B' = BACK ROLL GEAR 80 T., 84 T.

1.125" = DIA. OF FRONT ROLL

1.125" DIA. OF FRONT ROLL  
1.125" DIA. OF BACK ROLL

C'x B'x 1.125

$$\frac{C \times B \times 1.125}{E \times D \times 1.125} = \text{DRAUGHT}$$

621.1 x 1.125

$$\frac{C \times B \times 1.125}{\text{DRAUGHT CONSTANT}}$$

F x 1.125

DRAUGHT CONSTANT      == DRAUGHT GEAR

DRAUGHT

DRAUGHT CONSTANT — DRAUGHT

DRAUGHT GEAR

## Draught Gearing Constants.

Diameter of { Front Roll 1 in. Back Roll $\frac{1}{2}$ in.		Diameter of { Front Roll $1\frac{1}{2}$ in. Back Roll $1\frac{1}{2}$ in.	
Front Roll Gear, 28 T.	Constant	Front Roll Gear, 30 T.	Constant
Back Roll Gear, 84 T.		Back Roll Gear, 84 T.	
Crown Gear, 84 T.	288.00	Crown Gear, 120 T.	336.00
Front Roll Gear, 30 T.		Front Roll Gear, 32 T.	
Back Roll Gear, 84 T.		Back Roll Gear, 80 T.	
Crown Gear, 84 T.	268.80	Crown Gear, 114 T.	285.00
Front Roll Gear, 30 T.			
Back Roll Gear, 84 T.			
Crown Gear, 168 T.	537.60		
Front Roll Gear, 30 T.			
Back Roll Gear, 84 T.			
Crown Gear, 60 T.	192.00		
Front Roll Gear, 30 T.			
Back Roll Gear, 84 T.			
Crown Gear, 120 T.	384.00		

Rule:—To find Change Gear:—Divide Constant by Draught required.

# Spinning Draught Gear Table.

Front Roll 1 in. Dia.		Back Roll $\frac{3}{4}$ in. Dia.				F. R. $1\frac{1}{8}$ in. Dia. B. R. $1\frac{1}{8}$ in. Dia.	
Change  Gears	F.R.G 28T B.R.G 84T	Front Roll Gear 30T.		Back Roll Gear 84T.		F.R.G 30T B. R G 84T	F.R.G 32T B.R.G 80T
	84TCrown Gear	60TCrown Gear	84TCrown Gear	120 T. Crown Gear	168 T. Crown Gear	120T Crown Gear	114 T Crown Gear
	Draught.	Draught.	Draught.	Draught.	Draught.	Draught.	Draught.
26T	11.07	7.38	10.33	14.77		12.92	10.96
27		7.11		14.22		12.44	10.55
28	10.28	6.85	9.60	13.71		12.00	10.17
29		6.62		13.24		11.58	9.82
30	9.60	6.40	8.96	12.80	17.92	11.20	9.50
31		6.19		12.38		10.83	9.19
32	9.00	6.00	8.40	12.00	16.80	10.50	8.90
33		5.81		11.63		10.18	8.63
34	8.47	5.64	7.90	11.29	15.81	9.88	8.38
35		5.48		10.97		9.60	8.14
36	8.00	5.33	7.46	10.66	14.93	9.33	7.91
37		5.18		10.37		9.08	7.70
38	7.57	5.05	7.07	10.10	14.14	8.84	7.50
39		4.92		9.84		8.61	7.30
40	7.20	4.80	6.72	9.60		8.40	7.12
41		4.68		9.36	13.11	8.19	6.95
42	6.85	4.57	6.40	9.14		8.00	6.78
43				8.93		7.81	6.62
44	6.54		6.10		12.21		
45				8.53		7.46	6.33
46	6.26		5.84				
47					11.43		
48	6.00		5.60	8.00		7.00	5.93
50	5.76		5.37	7.68	10.75	6.72	5.70
52	5.53		5.16	7.38		6.46	5.48
53					10.14		
54	5.33		4.97	7.11		6.22	5.27
56	5.14		4.80	6.85	9.60	6.00	5.08
58	4.96		4.63	6.62		5.79	4.91
59					9.11		
60				6.40		5.60	4.75
62					8.67		
67					8.02		
72					7.46		
77					6.98		
82					6.55		
Const's	288.00	192.00	268.80	384.00	537.60	336.00	285.00

# STANDARD Twist Tables.

Counts or Numbers.	Square Root.	Frame Warp Twist.	Extra Mule Warp Twist.	Frame Filling Twist.	Mule Filling Twist.	Twist for Doubling.	Hosiery Yarn.
1	1.0000	4.75	4.00	3.50	3.25	2.75	2.50
2	1.4142	6.72	5.66	4.95	4.60	3.89	3.53
3	1.7320	8.23	6.93	6.06	5.63	4.76	4.33
4	2.0000	9.50	8.00	7.00	6.50	5.50	5.00
5	2.2360	10.62	8.94	7.83	7.27	6.15	5.59
6	2.4494	11.63	9.80	8.57	7.96	6.73	6.12
7	2.6457	12.56	10.58	9.26	8.60	7.27	6.61
8	2.8284	13.43	11.31	9.90	9.19	7.78	7.07
9	3.0000	14.25	12.00	10.50	9.75	8.25	7.50
10	3.1622	15.02	12.65	11.07	10.27	8.69	7.90
11	3.3166	15.75	13.26	11.61	10.78	9.12	8.29
12	3.4641	16.45	13.86	12.12	11.26	9.52	8.66
13	3.6055	17.12	14.42	12.62	11.72	9.91	9.01
14	3.7416	17.77	14.96	13.10	12.16	10.29	9.35
15	3.8729	18.39	15.49	13.56	12.59	10.65	9.68
16	4.0000	19.00	16.00	14.00	13.00	11.00	10.00
17	4.1231	19.58	16.49	14.43	13.40	11.34	10.31
18	4.2426	20.15	16.97	14.85	13.79	11.66	10.60
19	4.3588	20.70	17.43	15.26	14.17	11.98	10.89
20	4.4721	21.24	17.89	15.65	14.53	12.30	11.18
21	4.5825	21.76	18.33	16.04	14.89	12.60	11.46
22	4.6904	22.27	18.76	16.42	15.24	12.89	11.73
23	4.7958	22.78	19.80	16.79	15.59	13.19	11.99
24	4.8989	23.27	19.59	17.15	15.92	13.47	12.25
25	5.0000	23.75	20.00	17.50	16.25	13.75	12.50
26	5.0990	24.22	20.39	17.85	16.57	14.02	12.75
27	5.1961	24.68	20.78	18.19	16.89	14.29	12.99
28	5.2915	25.13	21.16	18.52	17.20	14.55	13.23
29	5.3851	25.58	21.54	18.85	17.50	14.81	13.46
30	5.4772	26.02	21.91	19.17	17.80	15.06	13.69
31	5.5677	26.44	22.27	19.49	18.10	15.31	13.92
32	5.6568	26.87	22.63	19.80	18.38	15.55	14.14
33	5.7445	27.28	22.98	20.11	18.67	15.80	14.36
34	5.8309	27.69	23.32	20.41	18.95	16.03	14.58
35	5.9160	28.10	23.66	20.71	19.23	16.27	14.79
36	6.0000	28.50	24.00	21.00	19.50	16.50	15.00
37	6.0827	28.89	24.33	21.29	19.77	16.72	15.21
38	6.1644	29.28	24.66	21.58	20.03	16.95	15.41
39	6.2449	29.66	24.98	21.86	20.30	17.17	15.61
40	6.3245	30.04	25.30	22.14	20.55	17.39	15.81
41	6.4031	30.42	25.61	22.41	20.81	17.61	16.01
42	6.4807	30.78	25.92	22.68	21.06	17.82	16.20
43	6.5574	31.14	26.23	22.95	21.31	18.03	16.39
44	6.6332	31.50	26.53	23.22	21.56	18.24	16.58
45	6.7082	31.86	26.83	23.48	21.80	18.45	16.77
46	6.7823	32.21	27.13	23.74	22.04	18.65	16.96
47	6.8556	32.56	27.42	23.99	22.28	18.85	17.14
48	6.9282	32.90	27.71	24.25	22.52	19.05	17.32
49	7.0000	33.25	28.00	24.50	22.75	19.25	17.50
50	7.0710	33.58	28.28	24.75	22.98	19.44	17.68

# STANDARD

## Twist Tables. Continued.

Counts or Numbers.	Square Root.	Frame Warp Twist.	Extra Mule Warp Twist.	Frame Filling Twist.	Mule Filling Twist.	Twist for Doubling.	Hosiery Yarn.
51	7.1414	33.92	28.56	24.99	23.21	19.64	17.85
52	7.2111	34.25	28.84	25.24	23.44	19.83	18.03
53	7.2801	34.58	29.12	25.48	23.66	20.02	18.20
54	7.3484	34.90	29.39	25.72	23.88	20.21	18.37
55	7.4161	35.22	29.66	25.96	24.10	20.39	18.54
56	7.4833	35.54	29.93	26.19	24.32	20.58	18.71
57	7.5498	35.86	30.20	26.42	24.53	20.76	18.87
58	7.6157	36.17	30.46	26.66	24.75	20.94	19.04
59	7.6811	36.48	30.72	26.88	24.96	21.12	19.20
60	7.7459	36.79	30.98	27.11	25.16	21.30	19.36
61	7.8102	37.10	31.24	27.34	25.38	21.48	
62	7.8740	37.40	31.49	27.56	25.59	21.65	
63	7.9372	37.70	31.74	27.78	25.79	21.83	
64	8.0000	38.00	32.00	28.00	26.00	22.00	
65	8.0622	38.29	32.25	28.22	26.20	22.17	
66	8.1240	38.59	32.49	28.43	26.40	22.34	
67	8.1853	38.88	32.74	28.65	26.60	22.51	
68	8.2462	39.16	32.98	28.86	26.80	22.68	
69	8.3066	39.46	33.22	29.07	26.99	22.84	
70	8.3666	39.74	33.46	29.28	27.19	23.01	
71	8.4261	40.02	33.70	29.49	27.38	23.17	
72	8.4852	40.30	33.94	29.70	27.58	23.33	
73	8.5440	40.58	34.17	29.90	27.77	23.50	
74	8.6023	40.86	34.41	30.11	27.96	23.65	
75	8.6602	41.14	34.64	30.31	28.14	23.81	
76	8.7177	41.41	34.87	30.51	28.33	23.97	
77	8.7749	41.68	35.09	30.71	28.51	24.13	
78	8.8317	41.95	35.32	30.91	28.70	24.28	
79	8.8881	42.22	35.55	31.11	28.89	24.44	
80	8.9442	42.48	35.77	31.30	29.07	24.60	
81	9.0000	42.75	36.00	31.50	29.25	24.75	
82	9.0553	43.01	36.22	31.69	29.43	24.90	
83	9.1104	43.27	36.44	31.89	29.61	25.05	
84	9.1651	43.53	36.66	32.08	29.79	25.20	
85	9.2195	43.79	36.88	32.27	29.96	25.35	
86	9.2736	44.05	37.09	32.46	30.14	25.50	
87	9.3273	44.30	37.31	32.65	30.31	25.65	
88	9.3808	44.56	37.52	32.83	30.48	25.79	
89	9.4339	44.81	37.73	33.02	30.66	25.94	
90	9.4868	45.06	37.95	33.20	30.83	26.09	
91	9.5393	45.31	38.16	33.39	31.00	26.23	
92	9.5916	45.56	38.36	33.57	31.17	26.37	
93	9.6436	45.80	38.57	33.75	31.34	26.52	
94	9.6953	46.05	38.78	33.93	31.51	26.66	
95	9.7467	46.30	38.98	34.11	31.67	26.80	
96	9.7979	46.54	39.19	34.29	31.84	26.94	
97	9.8488	46.78	39.39	34.47	32.01	27.08	
98	9.8994	47.02	39.60	34.65	32.17	27.22	
99	9.9498	47.26	39.80	34.82	32.33	27.36	
100	10.0000	47.50	40.00	35.00	32.50	27.50	

# STANDARD

## Twist Tables. Continued.

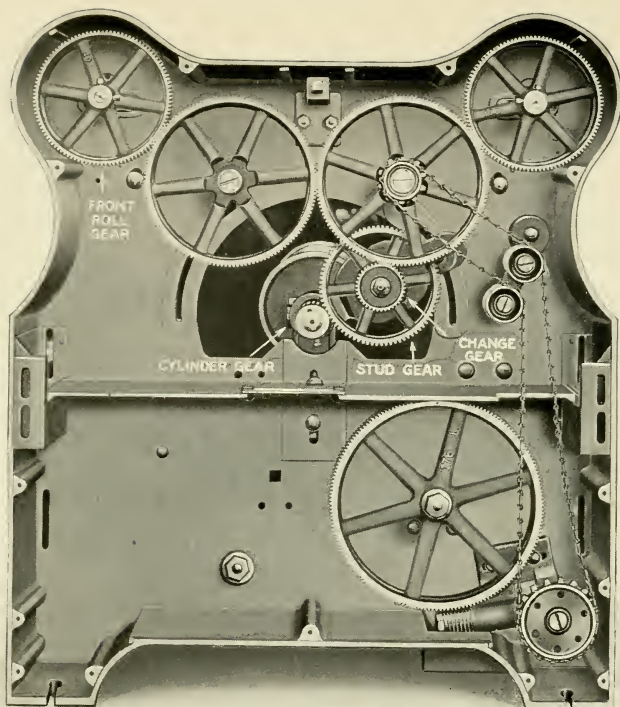
Counts or Numbers.	Square Root.	Frame Warp Twist.	Extra Mule Warp Twist.	Frame Filling Twist.	Mule Filling Twist.	Twist for Doubling.	Hosiery Yarn.
101	10.0499	47.74	40.20	35.17	32.66	27.64	
102	10.0995	47.97	40.40	35.35	32.82	27.77	
103	10.1489	48.21	40.60	35.52	32.98	27.91	
104	10.1980	48.44	40.79	35.69	33.14	28.04	
105	10.2470	48.67	40.99	35.86	33.30	28.18	
106	10.2956	48.90	41.18	36.03	33.46	28.31	
107	10.3441	49.13	41.38	36.20	33.62	28.44	
108	10.3923	49.36	41.57	36.37	33.78	28.58	
109	10.4403	49.59	41.76	36.54	33.93	28.71	
110	10.4881	49.82	41.95	36.71	34.09	28.84	
111	10.5357	50.04	42.14	36.87	34.24	28.97	
112	10.5830	50.27	42.33	37.04	34.39	29.10	
113	10.6301	50.49	42.52	37.21	34.55	29.23	
114	10.6771	50.72	42.71	37.37	34.70	29.36	
115	10.7238	50.94	42.90	37.53	34.85	29.49	
116	10.7703	51.16	43.08	37.70	35.00	29.62	
117	10.8167	51.38	43.27	37.86	35.15	29.75	
118	10.8628	51.60	43.45	38.02	35.30	29.87	
119	10.9087	51.82	43.63	38.18	35.45	30.00	
120	10.9545	52.03	43.82	38.34	35.60	30.12	
121	11.0000	52.25	44.00	38.50	35.75	30.25	
122	11.0454	52.47	44.18	38.66	35.90	30.27	
123	11.0905	52.68	44.36	38.82	36.04	30.50	
124	11.1355	52.89	44.54	38.97	36.19	30.62	
125	11.1803	53.11	44.72	39.13	36.34	30.75	
126	11.2250	53.32	44.90	39.29	36.48	30.87	
127	11.2694	53.53	45.08	39.44	36.63	30.99	
128	11.3137	53.74	45.25	39.60	36.77	31.11	
129	11.3578	53.95	45.43	39.75	36.91	31.23	
130	11.4018	54.16	45.61	39.91	37.06	31.35	
131	11.4455	54.37	45.78	40.06	37.20	31.48	
132	11.4891	54.57	45.96	40.21	37.34	31.60	
133	11.5326	54.78	46.13	40.36	37.48	31.71	
134	11.5758	54.99	46.30	40.52	37.62	31.83	
135	11.6190	55.19	46.48	40.67	37.76	31.95	
136	11.6619	55.39	46.65	40.82	37.90	32.07	
137	11.7047	55.60	46.82	40.97	38.04	32.19	
138	11.7473	55.80	46.99	41.12	38.18	32.31	
139	11.7898	56.00	47.16	41.26	38.32	32.42	
140	11.8322	56.20	47.33	41.41	38.45	32.54	
141	11.8743	56.40	47.50	41.56	38.59	32.65	
142	11.9164	56.60	47.67	41.71	38.73	32.77	
143	11.9583	56.80	47.83	41.85	38.86	32.89	
144	12.0000	57.00	48.00	42.00	39.00	33.00	
145	12.0416	57.20	48.17	42.15	39.14	33.11	
146	12.0830	57.39	48.33	42.29	39.27	33.23	
147	12.1244	57.59	48.50	42.44	39.40	33.34	
148	12.1655	57.79	48.66	42.58	39.54	33.46	
149	12.2066	57.98	48.83	42.72	39.67	33.57	
150	12.2474	58.18	48.99	42.87	39.80	33.68	



# STANDARD

## Twist Tables. Continued.

Counts or Numbers.	Square Root.	Frame Warp Twist.	Extra Mule Warp Twist.	Frame Filling Twist.	Mule Filling Twist.	Twist for Doubling.	Hosiery Yarn.
151	12.2882	58.37	49.15	43.01	39.94	33.79	
152	12.3288	58.56	49.32	43.15	40.07	33.90	
153	12.3693	58.75	49.48	43.29	40.20	34.02	
154	12.4097	58.95	49.64	43.43	40.33	34.13	
155	12.4499	59.14	49.80	43.57	40.46	34.24	
156	12.4900	59.33	49.96	43.72	40.59	34.35	
157	12.5300	59.52	50.12	43.86	40.72	34.46	
158	12.5698	59.71	50.28	43.99	40.85	34.57	
159	12.6095	59.90	50.44	44.13	40.98	34.68	
160	12.6491	60.08	50.60	44.27	41.11	34.79	
161	12.6886	60.27	50.75	44.41	41.24	34.89	
162	12.7279	60.46	50.91	44.55	41.37	35.00	
163	12.7671	60.64	51.07	44.68	41.49	35.11	
164	12.8062	60.83	51.22	44.82	41.62	35.22	
165	12.8452	61.01	51.38	44.96	41.75	35.32	
166	12.8841	61.20	51.54	45.09	41.87	35.43	
167	12.9228	61.38	51.69	45.23	42.00	35.54	
168	12.9615	61.57	51.85	45.37	42.12	35.64	
169	13.0000	61.75	52.00	45.50	42.25	35.75	
170	13.0384	61.93	52.15	45.63	42.37	35.86	
171	13.0767	62.11	52.31	45.77	42.50	35.96	
172	13.1149	62.30	52.46	45.90	42.62	36.07	
173	13.1529	62.48	52.61	46.04	42.75	36.17	
174	13.1909	62.66	52.76	46.17	42.87	36.27	
175	13.2288	62.84	52.92	46.30	42.99	36.38	
176	13.2665	63.02	53.07	46.43	43.12	36.48	
177	13.3041	63.19	53.22	46.56	43.24	36.59	
178	13.3417	63.37	53.37	46.70	43.36	36.69	
179	13.3791	63.55	53.52	46.83	43.48	36.79	
180	13.4164	63.73	53.67	46.96	43.60	36.90	
181	13.4536	63.90	53.81	47.09	43.72	37.00	
182	13.4907	64.08	53.96	47.22	43.84	37.10	
183	13.5277	64.26	54.11	47.35	43.97	37.20	
184	13.5647	64.43	54.26	47.48	44.09	37.30	
185	13.6015	64.61	54.41	47.61	44.20	37.40	
186	13.6382	64.78	54.55	47.73	44.32	37.51	
187	13.6748	64.96	54.70	47.86	44.44	37.61	
188	13.7113	65.13	54.85	47.99	44.56	37.71	
189	13.7477	65.30	54.99	48.12	44.68	37.81	
190	13.7840	65.47	55.14	48.24	44.80	37.91	
191	13.8203	65.65	55.28	48.37	44.92	38.01	
192	13.8564	65.82	55.43	48.50	45.03	38.11	
193	13.8924	65.99	55.57	48.62	45.15	38.20	
194	13.9284	66.16	55.71	48.75	45.27	38.30	
195	13.9642	66.33	55.86	48.87	45.38	38.40	
196	14.0000	66.50	56.00	49.00	45.50	38.50	
197	14.0357	66.67	56.14	49.12	45.62	38.60	
198	14.0712	66.84	56.28	49.25	45.73	38.70	
199	14.1067	67.01	56.43	49.37	45.85	38.79	
200	14.1421	67.17	56.57	49.50	45.96	38.89	



### Band Drive Spinning Frame Twist Gearing

*Formula for figuring twist:*

C = Cylinder Gear.

T = Change Gear.

R = Ratio whirl to Cylinder.

S = Stud Gear.

F = Front Roll Gear.

D = Circumference of Front Roll.

$$\frac{F \times S \times R}{C \times T \times D} = \text{Twist per inch.}$$

$$\frac{F \times S \times R}{C \times D} = \text{Twist Constant.}$$

$$\frac{\text{Twist Constant}}{\text{Change Gear}} = \text{Twist per inch.}$$

$$\frac{\text{Twist Constant}}{\text{Twist per inch}} = \text{Change Gear}$$

# BAND DRIVE

## Twist Gearing Constants for Whitin Spinning Frame.

### 7 Inch Cylinder.

Front Roll 1 in. Dia.										Front Roll Gear 108 T									
Diameter of Whirl	Ratio Whirl to Cylinder	Stud 100 T		Cyl. 20 T		Stud 90 T		Cyl. 22 T		Stud 88 T		Cyl. 20 T		Stud 80 T		Cyl. 36 T		Stud 74 T	
		Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't
$\frac{3}{8}$ in.	8.33	1431.81	1288.12	1144.99	1144.99	572.72	588.40	286.24	286.24	1036.36	1472.13	1308.56	1308.56	654.55	672.45	629.37	629.37	306.18	306.18
$\frac{1}{2}$ in.	7.68	1320.09	1187.60	1055.65	1055.65	528.04	542.48	263.91	263.91	1531.32	1377.81	1224.72	1224.72	612.61	612.61	584.86	584.86	284.53	284.53
$\frac{5}{8}$ in.	7.25	1246.18	1121.11	996.54	996.54	498.47	512.11	249.13	249.13	1423.22	1280.38	1138.12	1138.12	569.28	569.28	541.78	541.78	263.56	263.56
$1 \frac{1}{8}$ in.	6.62	1137.89	1023.69	909.94	909.94	455.16	467.61	227.48	227.48	1318.37	1186.06	1054.27	1054.27	527.35	527.35	500.10	500.10	243.29	243.29
$1 \frac{1}{4}$ in.	6.24	1072.57	964.93	857.71	857.71	429.03	440.77	214.42	214.42	1216.95	1094.82	973.17	973.17	486.78	486.78	460.32	460.32	223.67	223.67
$1 \frac{3}{8}$ in.	5.86	1007.25	906.16	805.48	805.48	402.90	413.92	201.37	201.37	1168.83	1051.52	934.69	934.69	457.53	457.53	439.35	439.35	213.74	213.74
$1 \frac{1}{2}$ in.	5.43	933.34	839.67	746.37	746.37	373.33	383.55	186.59	186.59	1069.13	961.83	854.96	854.96	427.65	427.65	408.82	408.82	198.31	198.31
$1 \frac{5}{8}$ in.	4.80	825.05	742.25	659.78	659.78	330.02	339.05	164.94	164.94	941.94	847.40	753.25	753.25	376.77	376.77	357.08	357.08	188.31	188.31

Front Roll $1 \frac{1}{8}$ in. Dia.										Front Roll Gear 108 T.									
Diameter of Whirl	Ratio Whirl to Cylinder	Stud 100 T		Cyl. 20 T		Stud 90 T		Cyl. 22 T		Stud 88 T		Cyl. 20 T		Stud 80 T		Cyl. 36 T		Stud 74 T	
		Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't	Const't
$\frac{3}{8}$ in.	8.33	1272.72	1144.99	1018.18	1018.18	509.09	523.32	254.54	254.54	1454.55	1309.09	1163.64	1163.64	581.82	597.98	559.07	559.07	272.27	272.27
$\frac{1}{2}$ in.	7.68	1173.41	1055.65	938.73	938.73	469.36	482.40	234.62	234.62	1361.34	1225.21	1089.07	1089.07	541.54	559.07	520.10	520.10	253.02	253.02
$\frac{5}{8}$ in.	7.25	1107.71	996.54	886.17	886.17	443.09	455.39	221.54	221.54	1265.09	1138.50	1012.07	1012.07	506.03	520.10	481.77	481.77	234.38	234.38
$1 \frac{1}{8}$ in.	6.62	1011.46	909.94	809.17	809.17	404.58	415.82	202.29	202.29	1171.89	1054.70	937.51	937.51	468.75	481.77	454.71	454.71	216.35	216.35
$1 \frac{1}{4}$ in.	6.24	953.30	857.71	762.71	762.71	381.36	391.95	190.68	190.68	1081.74	973.57	865.39	865.39	432.69	444.71	427.79	427.79	207.79	207.79
$1 \frac{3}{8}$ in.	5.86	895.34	805.48	716.27	716.27	358.14	368.09	179.07	179.07	1038.96	935.06	831.17	831.17	415.59	427.79	413.70	413.70	190.07	190.07
$1 \frac{1}{2}$ in.	5.43	829.64	746.37	663.71	663.71	331.85	341.08	165.33	165.33	950.34	855.31	760.27	760.27	380.14	390.70	370.27	370.27	180.07	180.07
$1 \frac{5}{8}$ in.	4.80	733.39	659.78	586.71	586.71	293.35	301.51	146.71	146.71	897.28	793.55	669.82	669.82	334.91	344.21	334.91	334.91	167.46	167.46

Rule to find Change Gear:- Divide Constant by Twist per inch Required

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 8.33

Whirl  $\frac{1}{4}$  inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	95.45	85.87	76.33		38.18	39.23	19.08
16	89.48	80.50	71.56		35.79	36.77	17.89
17	84.22	75.77	67.35		33.68	34.61	16.84
18	79.54	71.56	63.61		31.81	32.69	15.90
19	75.35	67.79	60.26		30.14	30.97	15.07
20	71.59	64.40	57.25		28.63	29.42	14.31
21	68.18	61.33	54.52		27.27	28.02	13.63
22	65.08	58.55	52.04		26.03	26.74	13.01
23	63.12	56.00	49.78		24.90	25.58	12.45
24	59.65	53.67	47.71	47.71	23.86	24.52	11.93
25	57.27	51.52	45.80	45.80	22.90	23.54	11.45
26	55.06	49.54	44.04	44.04	22.02	22.63	11.01
27	53.03	47.70	42.41	42.41	21.21	21.79	10.60
28	51.13	46.00	40.89	40.89	20.45	21.01	10.22
29	49.37	44.41	39.48	39.48	19.74	20.29	9.87
30	47.72	42.93	38.17	38.17	19.09	19.61	9.54
31	46.18	41.55	36.93	36.93	18.47	18.98	9.23
32	44.74	40.25	35.78	35.78	17.89	18.39	8.95
33	43.38	39.03	34.70	34.70	17.35	17.83	8.67
34	42.11	37.88	33.68	33.68	16.84	17.30	8.42
35	40.90	36.80	32.71	32.71	16.36	16.81	8.18
36	39.77	35.78	31.80	31.80	15.90	16.34	7.95
37	38.69	34.81	30.94	30.94	15.47	15.90	7.74
38	37.67	33.89	30.13	30.13	15.07	15.48	7.54
39	36.71	33.02	29.36	29.36	14.68	15.08	7.34
40	35.79	32.20	28.62	28.62	14.31	14.71	7.16
41	34.92	31.41	27.93	27.93	13.96	14.35	6.98
42	34.09	30.66	27.26	27.26	13.63	14.00	6.82
43	33.29	29.95	26.63	26.63	13.31	13.68	6.66
44	32.54	29.27	26.02	26.02	13.01	13.37	6.51
45	31.81	28.62	25.44	25.44	12.72	13.07	6.36
46	31.12	28.00	24.89	24.89	12.42	12.79	6.22
47	30.46	27.40	24.36	24.36	12.10	12.52	6.09
48	29.82	26.83	23.85	23.85	11.93	12.26	5.97
49	29.22	26.28	23.37	23.37	11.68	12.01	5.84
50	28.63	25.76	22.90	22.90	11.45	11.77	5.72
51	28.07	25.25	22.45	22.45	11.22	11.54	5.61
52	27.53	24.77	22.02	22.02	11.01	11.31	5.50
53	27.01	24.30	21.60	21.60	10.80	11.10	5.40
54	26.51	23.85	21.20	21.20	10.60	10.90	5.30
55	26.03	23.42	20.82	20.82	10.41	10.70	5.20
56	25.56	23.00	20.45	20.45	10.22	10.51	5.11
57	25.11	22.59	20.09	20.09	10.04	10.32	5.02
58	24.68	22.20	19.74	19.74	9.87	10.14	4.93
Const's	1431.81	1288.12	1144.99	1144.99	572.72	588.40	286.24

# BAND DRIVE Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 8.33  
Whirl  $\frac{1}{4}$  inch Diameter      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59	24.26	21.83	19.41	19.41	9.70	9.97	4.85
60	23.86	21.46	19.08	19.08	9.54	9.81	4.77
61	23.47	21.11	18.77	18.77	9.38	9.65	4.69
62	23.09	20.77	18.47	18.47	9.23	9.49	4.62
63	22.72	20.44	18.17	18.17	9.09	9.34	4.54
64	22.37	20.19	17.89	17.89	8.94	9.19	4.47
65	22.02	19.81	17.62	17.62	8.80	9.05	4.40
66	21.69	19.51	17.35	17.35	8.67	8.92	4.34
67	21.37	19.07	17.09	17.09	8.54	8.78	4.27
68	21.05	18.79	16.84	16.84	8.42	8.65	4.21
69	20.75	18.66	16.59	16.59	8.30	8.53	4.15
70	20.45	18.40	16.36	16.36	8.18	8.41	4.09
71	20.16	18.14	16.13	16.13	8.06	8.29	4.03
72	19.88	17.89	15.90	15.90	7.95	8.17	3.98
73	19.61	17.64	15.68	15.68	7.84	8.06	3.92
74	19.35	17.40	15.47	15.47	7.73	7.95	3.87
75	19.10	17.17	15.27	15.27	7.63	7.85	3.82
76	18.85	16.94	15.07	15.07	7.53	7.74	3.76
77	18.60	16.73	14.87	14.87	7.43	7.64	3.72
78	18.35	16.52	14.68	14.68	7.34	7.54	3.67
79	18.12	16.31	14.49	14.49	7.24	7.45	3.62
80	17.90	16.11	14.31	14.31	7.15	7.35	3.58
81	17.68	15.90	14.14	14.14	7.07	7.26	3.53
82	17.46	15.70	13.96	13.96	6.98	7.18	3.49
83	17.25	15.52	13.79	13.79	6.90	7.09	3.45
84	17.05	15.34	13.63	13.63	6.81	7.00	3.41
85	16.85	15.16	13.47	13.47	6.73	6.92	3.37
86	16.65	14.98	13.31	13.31	6.65	6.84	3.33
87	16.47	14.81	13.16	13.16	6.58	6.76	3.29
88	16.29	14.65	13.01	13.01	6.50	6.69	3.25
89	16.10	14.49	12.87	12.87	6.43	6.61	3.22
90	15.92	14.32	12.72	12.72	6.36	6.54	3.18
91	15.75	14.16	12.58		6.29	6.47	3.15
92	15.58	14.00	12.45		6.22	6.40	3.11
93	15.42	13.85	12.31		6.15	6.33	3.08
94	15.26	13.70	12.18		6.09	6.26	3.04
	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
	24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T
	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame
	15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T
Const's	1431 81	1288.12	1144.99	1144.99	572.72	588.40	286.24

# BAND DRIVE Spinning Twist Gear Table.

FRONT ROLL 1 inch Diameter.

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 7.68.

Whirl  $\frac{1\frac{3}{16}}$  inch Diameter.

Front Roll Gear 108 Teeth.

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	88.01	79.17	70.38		35.20	36.17	17.59
16	82.50	74.22	65.98		33.00	33.91	16.50
17	77.65	69.85	62.09		31.06	31.91	15.52
18	73.33	65.97	58.65		29.33	30.14	14.66
19	69.47	62.50	55.56		27.79	28.55	13.89
20	66.00	59.38	52.78		26.40	27.12	13.20
21	62.86	56.55	50.27		25.14	25.83	12.57
22	60.00	53.98	47.98		24.00	24.66	12.00
23	57.39	51.63	45.80		22.96	23.59	11.50
24	55.00	49.48	43.98	43.98	22.00	22.60	11.00
25	52.80	47.50	42.23	42.23	21.12	21.70	10.56
26	50.77	45.67	40.60	40.60	20.30	20.86	10.15
27	48.89	43.98	39.10	39.10	19.55	20.00	9.77
28	47.14	42.41	37.70	37.70	18.85	19.37	9.43
29	45.52	40.95	36.40	36.40	18.20	18.71	9.10
30	44.00	39.58	35.19	35.19	17.60	18.08	8.80
31	42.58	38.30	34.05	34.05	17.03	17.50	8.52
32	41.25	37.11	32.99	32.99	16.50	16.95	8.25
33	40.00	35.98	31.99	31.99	16.00	16.44	8.00
34	38.82	34.92	31.04	31.04	15.53	15.95	7.76
35	37.71	33.93	30.16	30.16	15.08	15.21	7.54
36	36.66	32.98	29.32	29.32	14.66	15.06	7.33
37	35.67	32.00	28.53	28.53	14.27	14.66	7.13
38	34.73	31.25	27.78	27.78	13.89	14.28	6.95
39	33.84	30.45	27.06	27.06	13.53	13.91	6.77
40	33.00	29.69	26.39	26.39	13.20	13.56	6.60
41	32.19	28.98	25.74	25.74	12.87	13.23	6.44
42	31.43	28.27	25.13	25.13	12.57	12.91	6.28
43	30.69	27.61	24.55	24.55	12.28	12.61	6.14
44	30.00	26.99	23.99	23.99	12.00	12.33	6.00
45	29.33	26.38	23.46	23.46	11.73	12.05	5.87
46	28.69	25.81	22.95	22.95	11.47	11.79	5.74
47	28.08	25.26	22.46	22.46	11.23	11.54	5.62
48	27.50	24.74	21.99	21.99	11.00	11.30	5.50
49	26.94	24.23	21.54	21.54	10.77	11.07	5.39
50	26.40	23.75	21.11	21.11	10.56	10.85	5.28
51	25.88	23.28	20.70	20.70	10.35	10.64	5.17
52	25.38	22.83	20.30	20.30	10.15	10.43	5.08
53	24.90	22.40	19.92	19.92	9.96	10.24	4.98
54	24.44	21.99	19.55	19.55	9.77	10.04	4.89
55	24.00	21.59	19.19	19.19	9.60	9.86	4.80
56	23.57	21.20	18.85	18.85	9.42	9.68	4.72
57	23.15	20.83	18.52	18.52	9.26	9.52	4.63
58	22.76	20.47	18.20	18.20	9.10	9.35	4.55
Const's	1320.09	1187.60	1055.65	1055.65	528.04	542.48	263.91



# BAND DRIVE Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 7.68.

Whirl  $\frac{1\frac{3}{8}}$  inch Diameter.

Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stub 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
5 T	22.37	20.12	17.89	17.89	8.94	9.19	4.47
60	22.00	19.73	17.59	17.59	8.80	9.04	4.40
61	21.64	19.46	17.31	17.31	8.66	8.89	4.33
62	21.29	19.15	17.03	17.03	8.51	8.75	4.26
63	20.95	18.85	16.76	16.76	8.38	8.61	4.19
64	20.62	18.55	16.49	16.49	8.25	8.48	4.12
65	20.30	18.27	16.24	16.24	8.12	8.35	4.06
66	20.00	17.99	15.99	15.99	8.00	8.22	4.00
67	19.70	17.72	15.76	15.76	7.88	8.10	3.94
68	19.41	17.46	15.52	15.52	7.76	7.98	3.88
69	19.13	17.20	15.30	15.30	7.65	7.86	3.82
70	18.85	16.96	15.08	15.08	7.54	7.75	3.77
71	18.59	16.71	14.87	14.87	7.43	7.64	3.72
72	18.33	16.49	14.66	14.66	7.33	7.53	3.67
73	18.09	16.26	14.46	14.46	7.23	7.43	3.62
74	17.84	16.04	14.27	14.27	7.13	7.33	3.57
75	17.60	15.83	14.08	14.08	7.04	7.23	3.52
76	17.38	15.63	13.89	13.89	6.94	7.14	3.47
77	17.16	15.43	13.71	13.71	6.85	7.04	3.43
78	16.93	15.23	13.53	13.53	6.76	6.95	3.38
79	16.71	15.03	13.36	13.36	6.68	6.87	3.34
80	16.51	14.85	13.20	13.20	6.60	6.78	3.30
81	16.30	14.67	13.03	13.03	6.51	6.70	3.26
82	16.10	14.49	12.87	12.87	6.43	6.62	3.22
83	15.93	14.31	12.72	12.72	6.36	6.54	3.18
84	15.72	14.14	12.57	12.57	6.28	6.46	3.14
85	15.53	13.97	12.42	12.42	6.21	6.38	3.10
86	15.35	13.81	12.28	12.28	6.14	6.31	3.07
87	15.17	13.65	12.13	12.13	6.06	6.24	3.03
88	15.00	13.50	12.00	12.00	6.00	6.16	3.00
89	14.83	13.35	11.86	11.86	5.93	6.10	2.97
90	14.67	13.20	11.73	11.73	5.86	6.03	2.93
91	14.51	13.05	11.60		5.80	5.96	2.90
92	14.35	12.91	11.47		5.73	5.90	2.87
93	14.19	12.77	11.35		5.67	5.83	2.84
94	14.04	12.63	11.23		5.61	5.77	2.81
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1320.09	1187.60	1055.65	1055.65	528.04	542.48	263.91

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 Inch Diameter.**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.25  
 Whirl  $\frac{7}{8}$  inch Diameter.      Front Roll Gear 108 Teeth

Change	Cyl. 20T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	83.08	74.74	66.44		33.23	34.14	16.61
16	77.88	70.07	62.28		31.15	32.00	15.57
17	73.30	65.94	58.62		29.32	30.12	14.65
18	69.23	62.28	55.36		27.69	28.45	13.84
19	65.58	59.00	52.45		26.23	26.95	13.11
20	62.30	56.05	49.83		24.92	25.60	12.46
21	59.34	53.38	47.45		23.73	24.39	11.86
22	56.64	50.95	45.30		22.65	23.28	11.32
23	54.18	48.74	43.33		21.67	22.26	10.83
24	52.18	46.71	41.52	41.52	20.76	21.33	10.38
25	50.16	44.84	39.86	39.86	19.93	20.48	9.97
26	48.15	43.11	38.32	38.32	19.17	19.70	9.58
27	46.15	41.52	36.91	36.91	18.46	18.97	9.23
28	44.65	40.03	35.59	35.59	17.80	18.29	8.89
29	43.18	38.65	34.36	34.36	17.18	17.66	8.59
30	41.65	37.37	33.22	33.22	16.61	17.07	8.30
31	40.20	36.16	32.15	32.15	16.07	16.52	8.04
32	39.00	35.03	31.14	31.14	15.57	16.00	7.78
33	37.80	33.97	30.20	30.20	15.10	15.52	7.55
34	36.70	32.97	29.31	29.31	14.70	15.06	7.33
35	35.61	32.03	28.47	28.47	14.24	14.63	7.12
36	34.61	31.14	27.68	27.68	13.84	14.22	6.92
37	33.68	30.30	26.93	26.93	13.47	13.84	6.73
38	32.79	29.50	26.22	26.22	13.11	13.48	6.55
39	31.95	28.74	25.55	25.55	12.75	13.13	6.38
40	31.15	28.02	24.91	24.91	12.46	12.80	6.23
41	30.39	27.34	24.30	24.30	12.15	12.49	6.08
42	29.67	26.69	23.73	23.73	11.86	12.19	5.93
43	28.98	26.07	23.17	23.17	11.59	11.91	5.80
44	28.32	25.47	22.65	22.65	11.32	11.64	5.66
45	27.69	24.91	22.14	22.14	11.07	11.38	5.53
46	27.09	24.37	21.66	21.66	10.83	11.13	5.42
47	26.51	23.85	21.20	21.20	10.60	10.89	5.30
48	25.96	23.35	20.76	20.76	10.38	10.67	5.19
49	25.43	22.87	20.34	20.34	10.17	10.45	5.08
50	24.92	22.42	19.93	19.93	9.96	10.24	4.98
51	24.52	21.98	19.54	19.54	9.77	10.04	4.89
52	23.96	21.55	19.16	19.16	9.58	9.85	4.79
53	23.51	21.15	18.80	18.80	9.40	9.66	4.70
54	23.07	20.76	18.45	18.45	9.23	9.48	4.62
55	22.65	20.38	18.12	18.12	9.06	9.31	4.53
56	22.25	20.01	17.79	17.79	8.90	9.14	4.45
57	21.86	19.66	17.48	17.48	8.74	8.98	4.37
58	21.48	19.32	17.18	17.18	8.59	8.83	4.29
Const's	1246.18	1121.11	996.54	996.54	498.47	512.11	249.13



# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.25  
 Whirl  $\frac{7}{8}$  inch Diameter      Front Roll Gear 108 Teeth

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 22 T	Cyl. 20 T	Cyl. 40 T	Cyl. 36 T	Cyl. 55 T
Gears	Stud 100 T	Stud 90 T	Stud 88 T	Stud 80 T	Stud 80 T	Stud 74 T	Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	21.12	19.00	16.89	16.89	8.44	8.68	4.22
60	20.76	18.68	16.61	16.61	8.30	8.53	4.15
61	20.42	18.37	16.34	16.34	8.17	8.39	4.08
62	20.09	18.08	16.07	16.07	8.03	8.26	4.02
63	19.78	17.79	15.82	15.82	7.91	8.13	3.95
64	19.49	17.51	15.57	15.57	7.78	8.00	3.89
65	19.17	17.24	15.33	15.33	7.66	7.88	3.83
66	18.88	16.98	15.10	15.10	7.55	7.76	3.77
67	18.59	16.73	14.87	14.87	7.43	7.64	3.72
68	18.32	16.48	14.65	14.65	7.33	7.53	3.66
69	18.06	16.24	14.44	14.44	7.22	7.42	3.61
70	17.80	16.00	14.24	14.24	7.12	7.32	3.56
71	17.55	15.79	14.04	14.04	7.02	7.21	3.51
72	17.30	15.57	13.84	13.84	6.92	7.11	3.46
73	17.07	15.35	13.65	13.65	6.82	7.02	3.41
74	16.84	15.15	13.47	13.47	6.73	6.92	3.37
75	16.62	14.95	13.29	13.29	6.64	6.83	3.32
76	16.40	14.76	13.11	13.11	6.55	6.74	3.28
77	16.19	14.57	12.94	12.94	6.47	6.65	3.24
78	16.98	14.38	12.78	12.78	6.39	6.57	3.19
79	15.77	14.19	12.61	12.61	6.30	6.48	3.15
80	15.58	14.02	12.46	12.46	6.23	6.40	3.11
81	15.39	13.85	12.30	12.30	6.15	6.32	3.08
82	15.20	13.68	12.15	12.15	6.07	6.25	3.04
83	15.01	13.51	12.01	12.01	6.00	6.17	3.00
84	14.83	13.35	11.86	11.86	5.93	6.10	2.97
85	14.66	13.19	11.72	11.72	5.88	6.02	2.93
86	14.49	14.04	11.59	11.59	5.79	5.95	2.90
87	14.32	12.89	11.45	11.45	5.72	5.89	2.86
88	14.16	12.74	11.32	11.32	5.66	5.82	2.83
89	14.00	12.60	11.20	11.20	5.60	5.75	2.80
90	14.84	12.46	11.07	11.07	5.53	5.69	2.77
91	13.69	12.32	10.95		5.47	5.63	2.74
92	13.54	12.19	10.83		5.41	5.57	2.71
93	13.40	12.06	10.72		5.35	5.51	2.68
94	13.26	11.93	10.60		5.30	5.45	2.65
Change	Change	Change	Change	Change	Change	Change	Change
Gears	Gears	Gears	Gears	Gears	Gears	Gears	Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1246.18	1121.11	996.54	996.54	498.47	512.11	249.13

# BAND DRIVE Spinning Twist Gear Table.

## FRONT ROLL 1 inch Diameter

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 6.62  
Whirl  $\frac{15}{16}$  inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15 T	75.86	68.25	60.66		30.34	31.17	15.17
16	71.11	63.98	56.87		28.44	29.23	14.22
17	66.94	60.21	53.53		26.77	27.51	13.38
18	63.21	56.87	50.55		25.28	25.98	12.64
19	59.88	53.87	47.89		23.95	24.61	11.97
20	56.89	51.18	45.50		22.75	23.38	11.37
21	54.18	48.74	43.33		21.67	22.27	10.83
22	51.72	46.53	41.36		20.68	21.26	10.34
23	49.47	44.50	39.56		19.78	20.33	9.89
24	47.41	42.65	37.91	37.91	18.96	19.48	9.48
25	45.51	40.94	36.40	36.40	18.20	18.70	9.10
26	43.76	39.37	35.00	35.00	17.50	17.99	8.75
27	42.14	37.91	33.70	33.70	16.85	17.32	8.43
28	40.63	36.56	32.50	32.50	16.25	16.70	8.12
29	39.23	35.29	31.38	31.38	15.69	16.12	7.84
30	37.92	34.12	30.33	30.33	15.17	15.59	7.58
31	36.70	33.02	29.35	29.35	14.68	15.08	7.34
32	35.55	31.99	28.44	28.44	14.22	14.61	7.11
33	34.48	31.02	27.57	27.57	13.76	14.17	6.89
34	33.46	30.10	26.76	26.76	13.38	13.75	6.69
35	32.51	29.24	26.00	26.00	13.00	13.36	6.50
36	31.60	28.43	25.28	25.28	12.64	12.99	6.32
37	30.75	27.66	24.59	24.59	12.30	12.64	6.15
38	29.94	26.93	23.95	23.95	11.97	12.31	5.99
39	29.17	26.24	23.33	23.33	11.67	11.99	5.83
40	28.44	25.59	22.75	22.75	11.47	11.69	5.69
41	27.75	24.96	22.19	22.19	11.10	11.41	5.55
42	27.09	24.37	21.66	21.66	10.83	11.13	5.42
43	26.46	23.80	21.16	21.16	10.58	10.87	5.29
44	25.86	23.26	20.68	20.68	10.34	10.63	5.17
45	25.28	22.74	20.22	20.22	10.11	10.39	5.06
46	24.73	22.25	19.78	19.78	9.89	10.17	4.95
47	24.21	21.78	19.36	19.36	9.68	9.95	4.84
48	23.70	21.32	18.96	18.96	9.48	9.74	4.74
49	23.22	20.89	18.57	18.57	9.28	9.54	4.64
50	22.75	20.47	18.20	18.20	9.10	9.35	4.55
51	22.31	20.07	17.84	17.84	8.92	9.17	4.46
52	21.88	19.68	17.50	17.50	8.75	8.99	4.38
53	21.46	19.31	17.17	17.17	8.58	8.82	4.29
54	21.07	18.95	16.85	16.85	8.42	8.66	4.21
55	20.68	18.61	16.54	16.54	8.27	8.50	4.14
56	20.31	18.28	16.25	16.25	8.12	8.35	4.06
57	19.96	17.95	15.96	15.96	7.98	8.20	3.99
58	19.61	17.64	15.69	15.69	7.84	8.06	3.92
Const's	1137.89	1023.69	909.94	909.94	455.16	467.61	227.48

# BAND DRIVE

## Spinning Twist Gear Table

### FRONT ROLL 1 inch Diameter

Cylinder 7 inches diameter.      Ratio Cylinder to Whirl 1 to 6.62  
 Whirl  $1\frac{5}{8}$  inch diameter.      Front Roll gear 108 teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	19.28	17.35	15.42	15.42	7.71	7.93	3.86
60	18.96	17.06	15.17	15.17	7.58	7.79	3.79
61	18.65	16.78	14.92	14.92	7.46	7.67	3.73
62	18.35	16.51	14.68	14.68	7.34	7.54	3.67
63	18.06	16.24	14.44	14.44	7.22	7.42	3.61
64	17.77	15.90	14.22	14.22	7.11	7.31	3.55
65	17.50	15.74	14.00	14.00	7.00	7.19	3.50
66	17.24	15.51	13.79	13.79	6.89	7.09	3.45
67	16.98	15.27	13.58	13.58	6.79	6.98	3.40
68	16.73	15.05	13.38	13.38	6.69	6.88	3.35
69	16.49	14.83	13.19	13.19	6.59	6.78	3.29
70	16.25	14.62	13.00	13.00	6.50	6.68	3.25
71	16.02	14.41	12.82	12.82	6.41	6.59	3.21
72	15.80	14.21	12.63	12.63	6.32	6.49	3.16
73	15.58	14.02	12.46	12.46	6.23	6.41	3.12
74	15.37	13.83	12.30	12.30	6.15	6.32	3.07
75	15.17	13.65	12.13	12.13	6.06	6.23	3.03
76	14.97	13.47	11.97	11.97	5.98	6.15	2.99
77	14.78	13.30	11.82	11.82	5.91	6.07	2.95
78	14.59	13.13	11.67	11.67	5.83	6.00	2.92
79	14.40	12.96	11.52	11.52	5.76	5.92	2.89
80	14.22	12.80	11.37	11.37	5.68	5.84	2.84
81	14.05	12.64	11.23	11.23	5.61	5.77	2.81
82	13.88	12.48	11.10	11.10	5.55	5.70	2.77
83	13.71	12.33	10.96	10.96	5.48	5.63	2.74
84	13.55	12.19	10.83	10.83	5.41	5.57	2.71
85	13.39	12.05	10.71	10.71	5.35	5.50	2.68
86	13.23	11.81	10.58	10.58	5.29	5.44	2.65
87	13.08	11.77	10.46	10.46	5.23	5.37	2.61
88	12.93	11.64	10.34	10.34	5.17	5.31	2.58
89	12.78	11.51	10.22	10.22	5.11	5.25	2.56
90	12.64	11.38	10.11	10.11	5.05	5.20	2.53
91	12.50	11.25	10.00		5.00	5.14	2.50
92	12.37	11.13	9.89		4.94	5.08	2.47
93	12.24	11.01	9.78		4.89	5.03	2.45
94	12.11	10.89	9.68		4.84	4.97	2.42
	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
	36" Frame 24-94 T	36" Frame 30-94 T	36" Frame 30-94 T	36" Frame 40-88 T	36" Frame 15-94 T	36" Frame 28-94 T	36" Frame 30-94 T
	39" Frame 15-70 T	39" Frame 15-86 T	39" Frame 15-86 T	39" Frame 24-90 T	39" Frame 15-94 T	39" Frame 15-94 T	39" Frame 15-94 T
Const's	1137.89	1023.69	909.94	909.94	455.16	467.01	227.48

# BAND DRIVE Spinning Twist Gear Table.

**FRONT ROLL 1 Inch Diameter.**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 6.24  
Whirl 1 inch Diameter.              Front Roll Gear 108 Teeth

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 22 T	Cyl. 20 T	Cyl. 40 T	Cyl. 36 T	Cyl. 55 T
Gears	Stud 100 T	Stud 90 T	Stud 88 T	Stud 80 T	Stud 80 T	Stud 74 T	Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	71.51	64.33	57.18		28.60	29.38	14.29
16	67.03	60.30	53.61		26.81	27.55	13.40
17	63.09	56.76	50.45		25.23	25.93	12.61
18	59.58	53.60	47.65		23.83	24.48	11.91
19	56.45	50.79	45.14		22.58	23.20	11.28
20	53.62	48.24	42.88		21.45	22.04	10.72
21	51.07	45.94	40.84		20.43	20.99	10.21
22	48.75	43.86	38.99		19.50	20.04	9.75
23	46.63	41.95	37.29		18.65	19.16	9.32
24	44.69	40.20	35.74	35.74	17.87	18.37	8.93
25	42.90	38.59	34.31	34.31	17.16	17.63	8.58
26	41.25	37.11	32.99	32.99	16.50	16.95	8.25
27	39.72	35.73	31.77	31.77	15.89	16.32	7.94
28	38.30	34.46	30.63	30.63	15.32	15.74	7.66
29	36.98	33.27	29.58	29.58	14.79	15.20	7.39
30	35.75	32.16	28.59	28.59	14.30	14.69	7.15
31	34.59	31.12	27.67	27.67	13.83	14.22	6.92
32	33.55	30.15	26.80	26.80	13.40	13.77	6.70
33	32.50	29.24	25.99	25.99	13.00	13.36	6.50
34	31.54	28.38	25.23	25.23	12.61	12.97	6.31
35	30.64	27.56	24.51	24.51	12.25	12.59	6.13
36	29.79	26.80	23.82	23.82	11.91	12.24	5.96
37	28.98	26.07	23.18	23.18	11.59	11.91	5.80
38	28.22	25.39	22.57	22.57	11.29	11.60	5.64
39	27.50	24.74	21.99	21.99	11.00	11.30	5.50
40	26.81	24.12	21.44	21.44	10.72	11.02	5.36
41	26.16	23.53	20.92	20.92	10.46	10.75	5.23
42	25.53	22.97	20.42	20.42	10.21	10.49	5.11
43	24.94	22.44	19.95	19.95	9.97	10.25	4.99
44	24.37	21.93	19.49	19.49	9.75	10.02	4.87
45	23.83	21.44	19.06	19.06	9.53	9.79	4.77
46	23.31	20.97	18.65	18.65	9.32	9.58	4.66
47	22.82	20.53	18.25	18.25	9.12	9.38	4.56
48	22.34	20.10	17.87	17.87	8.93	9.18	4.47
49	21.88	19.69	17.50	17.50	8.75	9.00	4.38
50	21.45	19.29	17.15	17.15	8.58	8.82	4.29
51	21.03	18.92	16.82	16.82	8.41	8.64	4.20
52	20.62	18.55	16.49	16.49	8.25	8.48	4.12
53	20.23	18.20	16.18	16.18	8.09	8.32	4.05
54	19.86	17.86	15.88	15.88	7.94	8.16	3.97
55	19.50	17.54	15.59	15.59	7.80	8.01	3.90
56	19.15	17.23	15.32	15.32	7.66	7.87	3.83
57	18.81	16.92	15.05	15.05	7.52	7.73	3.76
58	18.49	16.63	14.79	14.79	7.39	7.60	3.70
Const's	1072.57	964.93	857.71	857.71	429.03	440.77	214.42

# BAND DRIVE

## Spinning Twist Gear Table

**FRONT ROLL 1 inch Diameter**

Cylinder 7 inches diameter.      Ratio Cylinder to Whirl 1 to 6.24.  
 Whirl 1 inch diameter.      Front Roll gear 108 teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59	18.17	16.35	14.54	14.54	7.27	7.47	3.63
60	17.87	16.08	14.29	14.29	7.15	7.35	3.57
61	17.58	15.81	14.06	14.06	7.03	7.23	3.52
62	17.29	15.56	13.83	13.83	6.91	7.11	3.46
63	17.02	15.31	13.61	13.61	6.81	7.00	3.40
64	16.75	15.07	13.40	13.40	6.70	6.89	3.35
65	16.50	14.84	13.19	13.19	6.60	6.78	3.30
66	16.25	14.62	13.00	13.00	6.50	6.68	3.25
67	16.00	14.40	12.80	12.80	6.40	6.58	3.20
68	15.77	14.19	12.61	12.61	6.30	6.48	3.15
69	15.54	13.98	12.43	12.43	6.21	6.39	3.11
70	15.32	13.78	12.25	12.25	6.12	6.30	3.06
71	15.10	13.59	12.08	12.08	6.04	6.21	3.02
72	14.89	13.40	11.91	11.91	5.95	6.12	2.98
73	14.69	13.21	11.75	11.75	5.87	6.04	2.94
74	14.49	13.04	11.59	11.59	5.79	5.96	2.90
75	14.30	12.87	11.44	11.44	5.72	5.88	2.86
76	14.12	12.70	11.29	11.29	5.64	5.80	2.82
77	13.94	12.53	11.14	11.14	5.57	5.72	2.78
78	13.76	12.37	11.00	11.00	5.50	5.65	2.75
79	13.59	12.21	10.86	10.86	5.43	5.58	2.71
80	13.41	12.06	10.72	10.72	5.36	5.51	2.68
81	13.25	11.91	10.59	10.59	5.29	5.44	2.65
82	12.09	11.76	10.46	10.46	5.23	5.38	2.62
83	12.92	11.61	10.33	10.33	5.16	5.31	2.58
84	12.77	11.48	10.21	10.21	5.10	5.25	2.55
85	12.62	11.35	10.09	10.09	5.04	5.19	2.52
86	12.47	11.22	9.97	9.97	4.98	5.13	2.49
87	12.33	11.09	9.86	9.86	4.93	5.06	2.46
88	12.19	10.96	9.75	9.75	4.87	5.01	2.44
89	12.05	10.84	9.64	9.64	4.82	4.95	2.41
90	12.92	10.72	9.53	9.53	4.76	4.90	2.38
91	11.79	10.60	9.43		4.71	4.84	2.36
92	11.66	10.49	9.32		4.66	4.79	2.33
93	11.53	10.38	9.22		4.61	4.74	2.31
94	11.41	10.27	9.12		4.56	4.69	2.28
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1072.57	964.93	857.71	857.71	429.03	440.77	214.42

# BAND DRIVE Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 5.86.

Whirl  $1\frac{1}{16}$  inch Diameter.

Front Roll Gear 108 Teeth:

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15 T	67.15	60.41	53.70		26.86	27.59	13.42
16	62.95	56.63	50.34		25.18	25.87	12.59
17	59.25	53.30	47.33		23.70	24.35	11.84
18	55.95	50.34	44.75		22.38	22.99	11.19
19	53.01	47.60	43.29		21.20	21.79	10.60
20	50.36	45.30	40.27		20.14	20.70	10.07
21	47.96	43.15	38.36		19.18	19.71	9.59
22	45.78	41.18	36.61		18.31	18.81	9.15
23	43.79	39.39	35.02		17.52	18.00	8.76
24	41.96	37.75	33.56	33.56	16.78	17.25	8.39
25	40.29	36.24	32.22	32.22	16.11	16.56	8.06
26	38.74	34.85	30.98	30.98	15.49	15.92	7.75
27	37.39	33.56	29.83	29.83	14.84	15.33	7.47
28	35.97	32.36	28.77	28.77	14.38	14.78	7.19
29	34.73	31.24	27.77	27.77	13.88	14.27	6.94
30	33.57	30.20	26.85	26.85	13.43	13.80	6.71
31	32.49	29.23	25.98	25.98	12.99	13.35	6.50
32	31.47	28.31	25.17	25.17	12.59	12.94	6.29
33	30.52	27.45	24.41	24.41	12.20	12.54	6.10
34	29.62	26.65	23.69	23.69	11.85	12.17	5.92
35	28.77	25.89	23.01	23.01	11.51	11.82	5.75
36	27.97	25.17	22.37	22.37	11.19	11.50	5.59
37	27.22	24.49	21.77	21.77	10.88	11.19	5.44
38	26.50	23.84	21.20	21.20	10.60	10.89	5.30
39	25.82	23.23	20.65	20.65	10.33	10.61	5.16
40	25.18	22.65	20.14	20.14	10.07	10.35	5.04
41	24.56	22.10	19.65	19.65	9.82	10.09	4.91
42	23.98	21.57	19.18	19.18	9.59	9.86	4.80
43	23.42	21.07	18.73	18.73	9.36	9.63	4.68
44	22.88	20.59	18.31	18.31	9.15	9.41	4.58
45	22.38	20.13	17.90	17.90	8.95	9.20	4.48
46	21.89	19.69	17.51	17.51	8.75	9.00	4.38
47	21.43	19.28	17.14	17.14	8.57	8.81	4.29
48	20.98	18.87	16.78	16.78	8.39	8.62	4.20
49	20.55	18.49	16.44	16.44	8.22	8.45	4.11
50	20.14	18.12	16.11	16.11	8.05	8.28	4.03
51	19.75	17.76	15.79	15.79	7.90	8.12	3.95
52	19.37	17.42	15.49	15.49	7.74	7.96	3.87
53	19.00	17.09	15.20	15.20	7.60	7.81	3.80
54	18.65	16.78	14.92	14.92	7.46	7.67	3.73
55	18.31	16.47	14.64	14.64	7.32	7.53	3.66
56	17.98	16.18	14.38	14.38	7.19	7.39	3.60
57	17.67	15.89	14.13	14.13	7.06	7.26	3.53
58	17.36	15.62	13.89	13.89	6.94	7.14	3.47
Const's	1007.25	906.16	805.48	805.48	402.90	413.92	201.37

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 5.86.

Whirl  $1\frac{1}{16}$  inch Diameter.

Front Roll Gear 108 Teeth.

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
57T	17.07	15.35	13.65	13.65	6.82	7.02	3.41
60	16.78	15.10	13.42	13.42	6.71	6.90	3.36
61	16.61	14.85	13.20	13.20	6.60	6.78	3.39
62	16.24	14.61	12.99	13.99	6.49	6.68	3.25
63	15.98	14.38	12.79	12.79	6.39	6.57	3.20
64	15.73	14.15	12.59	12.59	6.29	6.47	3.15
65	15.49	13.94	12.39	12.39	6.19	6.37	3.10
66	15.26	13.72	12.20	12.20	6.10	6.27	3.05
67	15.03	13.52	12.02	12.02	6.01	6.18	3.01
68	14.81	13.32	11.85	11.85	5.92	6.09	2.96
69	14.59	13.13	11.67	11.67	5.83	6.00	2.92
70	14.38	12.94	11.51	11.51	5.75	5.91	2.88
71	14.18	12.76	11.34	11.34	5.67	5.83	2.84
72	13.98	12.58	11.19	11.19	5.59	5.75	2.80
73	13.79	12.41	11.03	11.03	5.51	5.67	2.76
74	13.61	12.24	10.88	10.88	5.44	5.59	2.72
75	13.43	12.08	10.74	10.74	5.37	5.52	2.68
76	13.26	11.92	10.60	10.60	5.30	5.45	2.65
77	13.09	11.77	10.46	10.46	5.23	5.38	2.62
78	12.92	11.62	10.33	10.33	5.16	5.31	2.58
79	12.75	11.47	10.20	10.20	5.10	5.24	2.55
80	12.59	11.33	10.07	10.07	5.03	5.17	2.52
81	12.44	11.19	9.94	9.94	4.97	5.11	2.49
82	12.29	11.05	9.82	9.82	4.91	5.05	2.46
83	12.14	10.92	9.70	9.70	4.85	4.99	2.43
84	12.00	10.79	9.59	9.59	4.79	4.93	2.40
85	12.86	10.66	9.48	9.48	4.74	4.87	2.37
86	12.72	10.53	9.37	9.37	4.68	4.81	2.34
87	11.58	10.41	9.26	9.26	4.63	4.76	2.31
88	11.45	10.29	9.15	9.15	4.57	4.70	2.29
89	11.32	10.18	9.05	9.05	4.51	4.65	2.26
90	11.19	10.07	8.95	8.95	4.47	4.60	2.24
91	11.07	9.96	8.85		4.42	4.55	2.21
92	10.95	9.85	8.76		4.37	4.50	2.19
93	10.83	9.74	8.66		4.33	4.45	2.17
94	10.72	9.64	8.57		4.28	4.40	2.14
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
33'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1007.25	906.16	805.48	805.48	402.90	413.92	291.37



# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

**Cylinder 7 inch Diameter.**      **Ratio Cylinder to Whirl 1 to 5.43.**

**Whirl 1½ inch Diameter.**      **Front Roll Gear 108 Teeth.**

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 22 T	Cyl. 20 T	Cyl. 40 T	Cyl. 36 T	Cyl. 55 T
Gears	Stud 100 T	Stud 90 T	Stud 88 T	Stud 80 T	Stud 80 T	Stud 74 T	Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	62.22	55.98	49.76		24.89	25.57	12.44
16	58.33	52.47	47.14		23.33	24.22	11.78
17	54.90	49.39	44.52		21.96	22.87	11.12
18	51.85	46.64	41.90		20.74	21.53	10.47
19	49.12	44.19	39.28		19.64	20.19	9.82
20	46.66	41.98	37.57		18.66	19.31	9.39
21	44.44	39.98	35.87		17.77	18.43	8.96
22	42.42	38.16	34.17		16.97	17.55	8.53
23	40.58	36.50	32.45		16.23	16.68	8.11
24	38.88	34.98	31.24	31.24	15.55	16.06	7.81
25	37.33	33.58	30.04	30.04	14.93	15.44	7.51
26	35.89	32.29	28.84	28.84	14.38	14.82	7.21
27	34.56	31.09	27.64	27.64	13.83	14.21	6.91
28	33.33	29.98	26.75	26.75	13.38	13.75	6.68
29	32.18	28.95	25.86	25.86	12.93	13.29	6.46
30	31.11	27.98	24.97	24.97	12.48	12.83	6.24
31	30.10	27.08	24.08	24.08	12.04	12.37	6.02
32	29.16	26.14	23.39	23.39	11.66	12.01	5.84
33	28.28	25.44	22.70	22.70	11.31	11.66	5.68
34	27.45	24.69	22.01	22.01	10.98	11.31	5.52
35	26.66	23.99	21.32	21.32	10.66	10.96	5.33
36	25.92	23.32	20.77	20.77	10.37	10.67	5.19
37	25.22	22.69	20.22	20.22	10.09	10.39	5.05
38	24.56	22.09	19.68	19.68	9.82	10.11	4.91
39	23.93	21.53	19.14	19.14	9.57	9.83	4.78
40	23.33	20.99	18.69	18.69	9.33	9.60	4.67
41	22.76	20.47	18.24	18.24	9.10	9.37	4.56
42	22.22	19.99	17.80	17.80	8.88	9.14	4.45
43	21.70	19.52	17.36	17.36	8.68	8.92	4.34
44	21.21	19.08	16.99	16.99	8.48	8.73	4.24
45	20.74	18.65	16.62	16.62	8.29	8.54	4.15
46	20.29	18.25	16.25	16.25	8.11	8.35	4.06
47	19.85	17.86	15.88	15.88	7.94	8.16	3.97
48	19.44	17.49	15.56	15.56	7.77	8.00	3.89
49	19.04	17.13	15.25	15.25	7.61	7.84	3.81
50	18.66	16.79	14.94	14.94	7.46	7.68	3.73
51	18.30	16.46	14.63	14.63	7.32	7.52	3.66
52	17.94	16.14	14.36	14.36	7.17	7.38	3.59
53	17.61	15.84	14.09	14.09	7.04	7.24	3.52
54	17.28	15.54	13.83	13.83	6.91	7.10	3.45
55	16.96	15.26	13.57	13.57	6.78	6.97	3.39
56	16.66	14.99	13.34	13.34	6.66	6.85	3.33
57	16.37	14.73	13.11	12.11	6.54	6.73	3.27
58	16.09	14.47	12.88	11.88	6.43	6.61	3.21
Const's	933.34	839.67	746.37	746.37	373.33	383.55	186.59



# BAND DRIVE Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 7 inch Diameter.      Ratio Cylinder to Whirl 1 to 5.43.

Whirl 1½ inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	15.81	14.23	12.65	12.65	6.32	6.50	3.16
60	15.55	13.99	12.45	12.45	6.22	6.39	3.11
61	15.30	13.76	12.25	12.25	6.12	6.29	3.06
62	15.05	13.54	12.05	12.05	6.02	6.19	3.01
63	14.81	13.32	11.85	11.85	5.92	6.09	2.96
64	14.58	13.11	11.67	11.67	5.83	5.99	2.91
65	14.35	12.90	11.49	11.49	5.74	5.90	2.86
66	14.14	12.72	11.31	11.31	5.65	5.81	2.82
67	13.93	12.53	11.14	11.14	5.57	5.72	2.78
68	13.72	12.34	10.98	10.98	5.49	5.64	2.74
69	13.52	12.16	10.82	10.82	5.41	5.56	2.70
70	13.33	11.99	10.66	10.66	5.33	5.48	2.66
71	13.14	11.82	10.51	10.51	5.25	5.40	2.63
72	12.96	11.66	10.37	10.37	5.18	5.32	2.59
73	12.78	11.50	10.23	10.23	5.11	5.25	2.56
74	12.61	11.35	10.09	10.09	5.04	5.18	2.52
75	12.44	11.20	9.95	9.95	4.97	5.11	2.49
76	12.28	11.05	9.82	9.82	4.90	5.04	2.45
77	12.12	10.91	9.69	9.69	4.84	4.98	2.42
78	11.96	10.77	9.57	9.57	4.78	4.92	2.39
79	11.81	10.63	9.45	9.45	4.72	4.86	2.36
80	11.66	10.50	9.33	9.33	4.66	4.80	2.33
81	11.52	10.37	9.21	9.21	4.60	4.74	2.30
82	11.38	10.24	9.10	9.10	4.55	4.68	2.27
83	11.24	10.12	8.99	8.99	4.49	4.62	2.25
84	11.11	10.00	8.88	8.88	4.44	4.56	2.22
85	10.98	9.88	8.78	8.78	4.39	4.51	2.19
86	10.85	9.76	8.68	8.68	4.34	4.46	2.16
87	10.73	9.65	8.58	8.58	4.29	4.41	2.14
88	10.61	9.54	8.48	8.48	4.24	4.36	2.11
89	10.49	9.43	8.38	8.38	4.19	4.31	2.09
90	10.37	9.33	8.29	8.29	4.14	4.26	2.07
91	10.26	9.23	8.20		4.10	4.21	2.05
92	10.15	9.13	8.11		4.05	4.16	2.02
93	10.04	9.03	8.02		4.01	4.12	1.99
94	9.93	8.93	7.94		3.97	4.08	1.97
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	933.34	839.67	746.37	746.37	373.33	383.55	186.59

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 Inch Diameter.**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 4.80  
 Whirl  $1\frac{5}{16}$  inch Diameter.      Front Roll Gear 108 Teeth

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	55.00	49.48	43.98		22.00	22.60	11.00
16	51.56	46.39	41.66		20.62	21.41	10.42
17	48.53	43.66	39.35		19.41	20.22	9.84
18	45.83	41.23	37.04		18.33	19.03	9.26
19	43.42	39.06	34.73		17.36	17.84	8.68
20	41.25	37.11	33.22		16.50	17.06	8.30
21	39.28	35.34	31.71		15.71	16.28	7.92
22	37.50	33.73	30.20		15.00	15.51	7.54
23	35.87	32.27	28.69		14.34	14.74	7.17
24	34.37	30.92	27.62	27.62	13.75	14.19	6.90
25	33.00	29.69	26.56	26.56	13.20	13.64	6.63
26	31.73	28.54	25.50	25.50	12.69	13.10	6.37
27	30.57	27.49	24.44	24.44	12.22	12.56	6.11
28	29.46	26.50	23.65	23.65	11.78	12.15	5.91
29	28.45	25.59	22.86	22.86	11.38	11.74	5.71
30	27.50	24.74	22.07	22.07	11.00	11.34	5.51
31	26.61	23.94	21.28	21.28	10.64	10.94	5.32
32	25.78	23.19	20.67	20.67	10.31	10.62	5.16
33	25.00	22.48	20.06	20.06	10.00	10.31	5.01
34	24.26	21.83	19.45	19.45	9.70	10.00	4.86
35	23.57	21.20	18.85	18.85	9.42	9.69	4.71
36	22.91	20.61	18.36	18.36	9.16	9.44	4.59
37	22.29	20.06	17.88	17.88	8.91	9.19	4.47
38	21.71	19.53	17.40	17.40	8.68	8.94	4.35
39	21.15	19.03	16.92	16.92	8.46	8.69	4.23
40	20.62	18.55	16.52	16.52	8.25	8.48	4.13
41	20.12	18.10	16.12	16.12	8.04	8.28	4.03
42	19.64	17.67	15.73	15.73	7.85	8.08	3.93
43	19.18	17.26	15.34	15.34	7.67	7.88	3.84
44	18.75	16.86	15.01	15.01	7.50	7.71	3.75
45	18.33	16.49	14.68	14.68	7.33	7.54	3.67
46	17.93	16.13	14.36	14.36	7.17	7.37	3.59
47	17.55	15.79	14.04	14.04	7.02	7.21	3.51
48	17.18	15.46	13.76	13.76	6.87	7.07	3.44
49	16.83	15.14	13.48	13.48	6.73	6.93	3.37
50	16.50	14.84	13.21	13.21	6.60	6.79	3.30
51	16.17	14.55	12.94	12.94	6.47	6.65	3.23
52	15.86	14.27	12.70	12.70	6.34	6.52	3.17
53	15.56	14.00	12.46	12.46	6.22	6.40	3.11
54	15.27	13.78	12.23	12.23	6.11	6.28	3.05
55	15.00	13.49	12.00	12.00	6.00	6.16	3.00
56	14.73	13.25	11.79	11.79	5.89	6.05	2.95
57	14.47	13.02	11.58	11.58	5.78	5.95	2.90
58	14.22	12.79	11.38	11.38	5.69	5.85	2.85
Const's	825.05	742.25	659.78	659.78	330.02	339.05	164.94

# BAND DRIVE Spinning Twist Gear Table.

## FRONT ROLL 1 inch Diameter

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 4.80  
Whirl  $1\frac{5}{16}$  inch Diameter      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	13.98	12.57	11.18	11.18	5.59	5.75	2.80
60	13.75	12.37	11.00	11.00	5.50	5.65	2.75
61	13.52	12.16	10.82	10.82	5.41	5.56	2.70
62	13.30	11.97	10.64	10.64	5.32	5.47	2.66
63	13.09	11.78	10.47	10.47	5.23	5.38	2.62
64	12.89	11.59	10.31	10.31	5.15	5.30	2.58
65	12.69	11.42	10.15	10.15	5.07	5.22	2.54
66	12.50	11.24	10.00	10.00	5.00	5.14	2.50
67	12.31	11.07	9.85	9.85	4.92	5.06	2.46
68	12.13	10.91	9.71	9.71	4.85	4.99	2.42
69	11.95	10.75	9.57	9.57	4.79	4.92	2.38
70	11.78	10.60	9.43	9.43	4.71	4.85	2.35
71	11.62	10.45	9.29	9.29	4.64	4.78	2.32
72	11.45	10.30	9.16	9.16	4.58	4.71	2.29
73	11.30	10.16	9.04	9.04	4.52	4.65	2.26
74	11.15	10.03	8.92	8.92	4.45	4.58	2.23
75	11.00	9.90	8.80	8.80	4.40	4.52	2.20
76	10.86	9.77	8.68	8.68	4.34	4.46	2.17
77	10.72	9.64	8.57	8.57	4.28	4.40	2.14
78	10.58	9.52	8.46	8.46	4.23	4.34	2.11
79	10.44	9.40	8.35	8.35	4.17	4.29	2.09
80	10.31	9.28	8.25	8.25	4.12	4.23	2.06
81	10.18	9.16	8.15	8.15	4.07	4.18	2.03
82	10.06	9.05	8.05	8.05	4.02	4.13	2.01
83	9.94	8.94	7.95	7.95	3.97	4.08	1.99
84	9.82	8.83	7.85	7.85	3.92	4.03	1.96
85	9.70	8.73	7.76	7.76	3.88	3.98	1.94
86	9.59	8.63	7.67	7.67	3.83	3.94	1.92
87	9.48	8.53	7.58	7.58	3.79	3.90	1.90
88	9.37	8.43	7.49	7.49	3.75	3.85	1.87
89	9.27	8.34	7.41	7.41	3.70	3.81	1.85
90	9.17	8.25	7.33	7.33	3.66	3.77	1.83
91	9.07	8.16	7.25		3.62	3.73	1.81
92	8.97	8.06	7.17		3.58	3.69	1.79
93	8.87	7.98	7.09		3.54	3.65	1.77
94	8.78	7.90	7.02		3.51	3.61	1.75
	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
	24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T
	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame
	15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T
Const's	825.05	742.25	659.78	659.78	330.02	339.05	104.94

# BAND DRIVE

## Spinning Twist Gear Table.

### FRONT ROLL 1 inch Diameter

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 9.52  
 Whirl  $\frac{1}{4}$  inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	100.05	98.15	87.24		43.62	44.83	21.81
16	102.27	92.00	81.78		40.90	42.03	20.45
17	96.25	86.59	76.97		38.50	39.56	19.24
18	90.90	81.78	72.70		36.16	37.36	18.17
19	86.12	77.48	68.87		34.45	35.39	17.22
20	81.81	73.60	65.43		32.72	33.62	16.36
21	76.92	70.10	62.31		31.16	32.02	15.58
22	74.38	66.91	59.48		29.75	30.56	14.87
23	71.14	64.00	56.89		28.45	29.23	14.22
24	68.18	61.33	54.52	54.52	27.27	28.02	13.63
25	65.45	58.88	52.34	52.34	26.18	26.90	13.08
26	62.93	56.62	50.33	50.33	25.17	25.86	12.58
27	60.60	54.52	48.46	48.46	24.24	24.90	12.12
28	58.44	52.57	46.73	46.73	23.37	24.01	11.68
29	56.42	50.76	45.12	45.12	22.57	23.19	11.28
30	54.54	49.07	43.62	43.62	21.81	22.41	10.90
31	52.78	47.48	42.21	42.21	21.11	21.69	10.55
32	51.13	46.03	40.89	40.89	20.45	21.01	10.22
33	49.58	44.61	39.65	39.65	19.83	20.38	9.91
34	48.12	43.29	38.49	38.49	19.25	19.78	9.62
35	46.75	42.06	37.39	37.39	18.69	19.21	9.35
36	45.45	40.89	36.35	36.35	18.18	18.68	9.09
37	44.22	39.78	35.37	35.37	17.69	18.71	8.84
38	43.06	38.74	34.44	34.44	17.22	17.69	8.60
39	41.95	37.74	33.55	33.55	16.78	17.24	8.38
40	40.90	36.80	32.71	32.71	16.36	16.81	8.18
41	39.91	35.90	31.91	31.91	15.96	16.40	7.98
42	38.96	35.05	31.16	31.16	15.58	16.01	7.79
43	38.05	34.23	30.43	30.43	15.22	15.64	7.61
44	37.19	33.46	29.74	29.74	14.87	15.28	7.43
45	36.36	32.71	29.08	29.08	14.54	14.94	7.27
46	35.57	32.00	28.45	28.45	14.22	14.62	7.11
47	34.81	31.32	27.84	27.84	13.92	14.31	6.96
48	34.09	30.66	27.26	27.26	13.63	14.01	6.81
49	33.39	30.04	26.71	26.71	13.35	13.72	6.68
50	32.72	29.44	26.17	26.17	13.09	13.45	6.54
51	32.08	28.86	25.66	25.66	12.83	13.19	6.41
52	31.35	28.31	25.16	25.16	12.58	12.93	6.29
53	30.87	27.77	24.69	24.69	12.35	12.69	6.17
54	30.30	27.26	24.23	24.23	12.12	12.45	6.06
55	29.75	26.76	23.79	23.79	11.90	12.23	5.95
56	29.22	26.28	23.37	23.37	11.61	12.01	5.84
57	28.70	25.82	22.96	22.96	11.48	11.80	5.74
58	28.21	25.38	22.56	22.56	11.28	11.59	5.64
Const's	1636.36	1472.13	1308.56	1308.56	654.55	672.45	327.14

# BAND DRIVE Spinning Twist Gear Table

**FRONT ROLL 1 inch Diameter**

Cylinder 8 inches diameter.      Ratio Cylinder to Whirl 1 to 9.52

Whirl  $\frac{3}{4}$  inch diameter.      Front Roll gear 108 teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	27.73	24.95	22.18	22.18	11.09	11.40	5.54
60	27.27	24.54	21.81	21.81	10.90	11.21	5.45
61	26.82	24.13	21.45	21.45	10.73	11.02	5.36
62	26.39	23.74	21.11	21.11	10.55	10.85	5.28
63	25.97	23.36	20.77	20.77	10.38	10.67	5.19
64	25.56	23.00	20.45	20.45	10.22	10.51	5.11
65	25.17	22.64	20.13	20.13	10.07	10.35	5.03
66	24.79	22.30	19.83	19.83	9.92	10.19	4.96
67	24.42	21.97	19.53	19.53	9.76	10.04	4.88
68	24.06	21.61	19.24	19.24	9.62	9.89	4.81
69	23.71	21.33	18.97	18.97	9.48	9.75	4.74
70	23.37	21.03	18.69	18.69	9.35	9.61	4.67
71	23.04	20.73	18.43	18.43	9.21	9.47	4.61
72	22.72	20.44	18.17	18.17	9.09	9.34	4.54
73	22.41	20.16	17.93	17.93	8.96	9.21	4.48
74	22.11	19.89	17.68	17.68	8.84	9.09	4.42
75	21.81	19.62	17.45	17.45	8.72	8.97	4.36
76	21.53	19.37	17.22	17.22	8.61	8.85	4.30
77	21.25	19.11	16.99	16.99	8.50	8.73	4.25
78	20.98	18.87	16.80	16.80	8.39	8.62	4.19
79	20.71	18.63	16.56	16.56	8.28	8.51	4.14
80	20.45	18.40	16.36	16.36	8.18	8.41	4.09
81	20.20	18.17	16.15	16.15	8.08	8.30	4.04
82	19.95	17.95	15.96	15.96	7.98	8.20	3.99
83	19.71	17.73	15.75	15.75	7.88	8.10	3.94
84	19.48	17.52	15.58	15.58	7.79	8.01	3.89
85	19.25	17.31	15.39	15.39	7.70	7.91	3.85
86	19.02	17.11	15.22	15.22	7.61	7.82	3.80
87	18.80	16.92	15.04	15.04	7.52	7.73	3.76
88	18.59	16.72	14.87	14.87	7.43	7.64	3.72
89	18.38	16.54	14.70	14.70	7.35	7.56	3.68
90	18.18	16.35	14.54	14.54	7.27	7.47	3.63
91	17.98	16.17	14.38		7.19	7.39	3.59
92	17.78	16.00	14.22		7.11	7.31	3.56
93	17.59	15.83	14.07		7.03	7.23	3.52
94	17.40	15.66	13.92		6.96	7.15	3.48
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1636.36	1472.13	1308.56	1308.56	654.55	672.45	327.14

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 8.91.

Whirl  $1\frac{3}{8}$  inch Diameter.

Front Roll Gear 108 Teeth.

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15 T	102.05	91.85	81.65		40.82	41.96	20.41
16	95.70	86.11	76.55		38.28	39.93	19.13
17	90.07	81.04	72.04		36.03	37.02	18.01
18	85.07	76.54	68.04		34.03	34.96	17.01
19	80.59	72.51	64.46		32.24	33.12	16.11
20	76.56	68.89	61.24		30.63	31.46	15.31
21	72.92	65.61	58.31		29.17	29.97	14.58
22	69.60	62.62	55.67		27.84	28.61	13.92
23	66.57	59.90	53.25		26.63	27.36	13.31
24	63.80	57.40	51.03	51.03	25.52	26.22	12.76
25	61.25	55.11	48.99	48.99	24.50	25.17	12.25
26	58.88	52.99	47.10	47.10	23.56	24.21	11.77
27	56.71	51.03	45.36	45.36	22.68	23.31	11.34
28	54.69	49.20	43.74	43.74	21.87	22.48	10.93
29	52.80	47.51	42.23	42.23	21.12	21.70	10.55
30	51.04	45.92	40.82	40.82	20.42	20.98	10.21
31	49.39	44.44	39.51	39.51	19.76	20.30	9.88
32	47.85	43.05	38.28	38.28	19.14	19.67	9.57
33	46.40	41.75	37.12	37.12	18.56	19.07	9.28
34	45.03	40.52	36.02	36.02	18.01	18.51	9.01
35	43.75	39.36	35.14	35.14	17.50	17.98	8.75
36	42.53	38.21	34.02	34.02	17.01	17.48	8.51
37	41.38	37.23	33.10	33.10	16.55	17.01	8.27
38	40.29	36.25	32.23	32.23	16.12	16.55	8.05
39	39.26	35.32	31.40	31.40	15.70	16.13	7.85
40	38.28	34.44	30.62	30.62	15.31	15.73	7.65
41	37.34	33.60	29.88	29.88	14.94	15.35	7.47
42	36.46	32.80	29.16	29.16	14.58	14.98	7.29
43	35.61	32.04	28.48	28.48	14.24	14.64	7.12
44	34.80	31.31	27.84	27.84	13.92	14.30	6.96
45	34.03	30.61	27.21	27.21	13.61	13.98	6.80
46	33.28	29.95	26.62	26.62	13.31	13.68	6.65
47	32.58	29.31	26.06	26.06	13.03	13.39	6.51
48	31.90	28.70	25.52	25.52	12.76	13.11	6.38
49	31.25	28.11	24.99	24.99	12.50	12.84	6.25
50	30.62	27.55	24.49	24.49	12.25	12.59	6.12
51	30.02	27.01	24.01	24.01	12.01	12.34	6.00
52	29.44	26.49	23.56	23.56	11.78	12.10	5.89
53	28.88	25.99	23.11	23.11	11.55	11.88	5.78
54	28.35	25.51	22.68	22.68	11.34	11.66	5.67
55	27.84	25.05	22.27	22.27	11.17	11.45	5.57
56	27.34	24.60	21.87	21.87	10.93	11.24	5.46
57	26.86	24.17	21.49	21.49	10.74	11.04	5.37
58	26.40	23.75	21.12	21.12	10.56	10.85	5.28
Const's	1531.32	1377.81	1224.72	1224.72	612.61	629.37	306.18



# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.      Ratio Cylinder to Whirl 1 to 8.91.

Whirl  $\frac{1\frac{3}{8}}$  inch Diameter.      Front Roll Gear 108 Teeth.

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	25.95	23.30	20.76	20.76	10.38	10.67	5.19
60	25.52	22.96	20.41	20.41	10.21	10.49	5.10
61	25.10	22.59	20.08	20.08	10.04	10.32	5.02
62	24.69	22.22	19.75	19.75	9.88	10.15	4.94
63	24.30	21.87	19.44	19.44	9.72	9.99	4.86
64	23.92	21.52	19.14	19.14	9.57	9.83	4.78
65	23.55	21.19	18.84	18.84	9.42	9.68	4.71
66	23.20	20.87	18.56	18.56	9.28	9.54	4.64
67	22.85	20.56	18.28	18.28	9.14	9.39	4.57
68	22.51	20.26	18.01	18.01	9.00	9.25	4.50
69	22.19	19.96	17.75	17.75	8.87	9.12	4.44
70	21.87	19.68	17.50	17.50	8.75	8.99	4.37
71	21.56	19.40	17.25	17.25	8.62	8.86	4.31
72	21.26	19.13	17.01	17.01	8.50	8.74	4.25
73	20.97	18.87	16.78	16.78	8.39	8.62	4.19
74	20.69	18.61	16.55	16.55	8.27	8.51	4.14
75	20.41	18.37	16.33	16.33	8.16	8.39	4.08
76	20.14	18.12	16.11	16.11	8.06	8.28	4.03
77	19.88	17.89	15.91	15.91	7.95	8.17	3.98
78	19.63	17.66	15.70	15.70	7.85	8.07	3.93
79	19.38	17.44	15.50	15.50	7.75	7.97	3.88
80	19.14	17.22	15.31	15.31	7.65	7.87	3.83
81	18.90	17.01	15.12	15.12	7.56	7.77	3.78
82	18.67	16.80	14.94	14.94	7.47	7.68	3.73
83	18.44	16.60	14.75	14.75	7.38	7.58	3.69
84	18.23	16.40	14.58	14.58	7.29	7.49	3.65
85	18.01	16.20	14.41	14.41	7.20	7.40	3.60
86	17.80	16.02	14.24	14.24	7.12	7.32	3.56
87	17.60	15.82	14.08	14.08	7.04	7.23	3.52
88	17.40	15.65	13.92	13.92	6.96	7.15	3.48
89	17.20	15.48	13.76	13.76	6.88	7.07	3.44
90	17.01	15.30	13.61	13.61	6.80	6.99	3.40
91	16.82	15.14	13.46		6.73	6.92	3.36
92	16.64	14.97	13.31		6.65	6.84	3.33
93	16.46	14.81	13.17		6.58	6.77	3.29
94	16.29	14.65	13.03		6.51	6.70	3.26
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1531.32	1377.81	1224.72	1224.72	612.61	629.37	306.18

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 Inch Diameter.**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 8.28  
Whirl  $\frac{7}{8}$  inch Diameter.      Front Roll Gear 108 Teeth

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	94.85	85.37	75.87		37.94	38.99	18.97
16	88.95	80.02	71.13		35.58	36.55	17.78
17	83.71	75.31	66.95		33.48	34.40	16.74
18	79.06	71.13	63.23		31.62	32.49	15.81
19	74.90	67.38	59.90		29.96	30.78	14.97
20	71.16	64.01	56.91		28.46	29.24	14.22
21	67.77	60.97	54.20		27.10	27.85	13.55
22	64.69	58.19	51.73		25.87	26.58	12.93
23	61.87	55.66	49.48		24.75	25.42	12.37
24	59.30	53.34	47.42	47.42	23.72	24.37	11.86
25	56.92	51.21	45.52	45.52	22.77	23.39	11.38
26	54.73	49.24	43.77	43.77	21.89	22.49	10.94
27	52.71	47.42	42.15	42.15	21.08	21.66	10.54
28	50.82	45.72	40.65	40.65	20.33	20.89	10.16
29	48.04	44.15	39.24	39.24	19.63	20.17	9.81
30	47.44	42.67	37.94	37.94	18.97	19.49	9.48
31	45.91	41.30	36.71	36.71	18.36	18.87	9.18
32	44.47	40.01	35.57	35.57	17.79	18.28	8.89
33	43.12	38.79	34.49	34.49	17.25	17.72	8.62
34	41.85	37.65	33.47	33.47	16.74	17.20	8.37
35	40.66	36.58	32.52	32.52	16.26	16.71	8.13
36	39.53	35.56	31.61	31.61	15.81	16.24	7.90
37	38.46	34.60	30.76	30.76	15.38	15.81	7.69
38	37.45	33.69	29.95	29.95	14.98	15.39	7.49
39	36.49	32.83	29.18	29.18	14.59	15.00	7.29
40	35.58	32.00	28.45	28.45	14.23	14.62	7.11
41	34.71	31.22	27.76	27.76	13.88	14.26	6.94
42	33.88	30.48	27.10	27.10	13.55	13.92	6.77
43	33.09	29.77	26.47	26.47	13.23	13.60	6.62
44	32.36	29.10	25.87	25.87	12.93	13.29	6.47
45	31.62	28.45	25.29	25.29	12.65	13.00	6.32
46	30.93	27.83	24.74	24.74	12.37	12.71	6.18
47	30.28	27.24	24.21	24.21	12.11	12.44	6.05
48	29.65	26.67	23.71	23.71	11.86	12.18	5.93
49	29.04	26.10	23.23	23.23	11.61	11.94	5.81
50	28.46	25.60	22.76	22.76	11.38	11.70	5.69
51	27.90	25.10	22.32	22.32	11.16	11.47	5.58
52	27.36	24.62	21.89	21.89	10.94	11.25	5.47
53	26.85	24.15	21.49	21.49	10.74	11.04	5.37
54	26.35	23.71	21.08	21.08	10.54	10.83	5.27
55	25.87	23.27	20.69	20.69	10.35	10.63	5.17
56	25.41	22.86	20.32	20.32	10.16	10.44	5.08
57	24.96	22.46	19.97	19.97	9.98	10.26	4.99
58	24.53	22.07	19.62	19.62	9.81	10.08	4.91
Const's	1423.22	1280.38	1138.12	1138.12	569.28	534.86	284.53



# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.      Ratio Cylinder to Whirl 1 to 8.28.  
 Whirl  $\frac{7}{8}$  inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	24.12	21.70	19.29	19.29	9.64	9.91	4.82
60	23.72	21.33	18.97	18.97	9.48	9.75	4.74
61	23.33	20.98	18.66	18.66	9.33	9.59	4.66
62	22.95	20.65	18.36	18.36	9.18	9.43	4.59
63	22.59	20.32	18.07	18.07	9.03	9.28	4.52
64	22.23	20.00	17.78	17.78	8.89	9.14	4.45
65	21.89	19.69	17.51	17.51	8.75	9.00	4.38
66	21.56	19.39	17.24	17.24	8.62	8.86	4.31
67	21.24	19.11	16.99	16.99	8.49	8.73	4.25
68	20.92	18.83	16.74	16.74	8.37	8.60	4.18
69	20.62	18.55	16.49	16.49	8.25	8.48	4.12
70	20.33	18.29	16.26	16.26	8.13	8.36	4.06
71	20.04	18.03	16.03	16.03	8.01	8.24	4.01
72	19.76	17.78	15.81	15.81	7.90	8.12	3.95
73	19.49	17.53	15.59	15.59	7.79	8.01	3.90
74	19.23	17.30	15.38	15.38	7.69	7.90	3.84
75	18.97	17.07	15.17	15.17	7.59	7.80	3.79
76	18.72	16.84	14.98	14.98	7.49	7.70	3.74
77	18.48	16.62	14.78	14.78	7.39	7.60	3.70
78	18.24	16.41	14.59	14.59	7.29	7.50	3.65
79	18.01	16.20	14.41	14.41	7.20	7.40	3.60
80	17.79	16.00	14.23	14.23	7.11	7.31	3.56
81	17.57	15.80	14.05	14.05	7.02	7.22	3.51
82	17.35	15.61	13.88	13.88	6.94	7.13	3.47
83	17.14	15.42	13.71	13.71	6.85	7.05	3.43
84	16.94	15.24	13.55	13.55	6.77	6.96	3.39
85	16.74	15.06	13.39	13.39	6.69	6.88	3.35
86	16.54	14.88	13.23	13.23	6.61	6.80	3.31
87	16.35	14.71	13.08	13.08	6.54	6.72	3.27
88	16.17	14.54	12.93	12.93	6.46	6.65	3.23
89	15.99	14.38	12.79	12.79	6.39	6.57	3.20
90	15.81	14.22	12.65	12.65	6.32	6.50	3.16
91	15.53	14.07	12.51		6.25	6.43	3.13
92	15.46	13.91	12.37		6.18	6.36	3.09
93	15.30	13.76	12.24		6.12	6.29	3.06
94	15.14	13.62	12.11		6.05	6.22	3.03
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1423.22	1280.38	1138.12	1138.12	569.28	584.86	284.53

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 7.67.

Whirl  $\frac{15}{16}$  inch Diameter.

Front Roll Gear 108 Teeth.

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	87.85	79.06	70.28		35.14	36.12	17.57
16	82.39	74.12	65.89		32.95	33.86	16.48
17	77.55	69.76	62.02		31.02	31.87	15.50
18	73.24	65.89	58.57		29.29	30.10	14.64
19	69.38	62.42	55.49		27.75	28.52	13.87
20	65.91	59.30	52.78		26.36	27.12	13.20
21	62.77	56.47	50.27		25.11	25.83	12.57
22	59.92	53.91	47.98		23.96	24.66	12.00
23	57.32	51.56	45.89		22.92	23.59	11.50
24	54.93	49.41	43.98	43.98	21.97	22.60	11.00
25	52.73	47.44	42.23	42.23	21.09	21.70	10.56
26	50.70	45.62	40.60	40.60	20.28	20.86	10.15
27	48.82	43.92	39.10	39.10	19.53	20.09	9.77
28	47.08	42.35	37.70	37.70	18.83	19.37	9.43
29	45.46	40.89	36.40	36.40	18.17	18.71	9.10
30	43.94	39.53	35.19	35.19	17.57	18.08	8.80
31	42.52	38.26	34.05	34.05	17.01	17.50	8.52
32	41.19	37.06	32.99	32.99	16.47	16.95	8.25
33	39.95	35.94	31.99	31.99	15.98	16.44	8.00
34	38.77	34.88	31.04	31.04	15.51	15.95	7.76
35	37.66	33.88	30.16	30.16	15.09	15.21	7.54
36	36.62	32.94	29.32	29.32	14.64	15.06	7.33
37	35.63	32.05	28.53	28.53	14.25	14.66	7.13
38	34.69	31.21	27.78	27.78	13.87	14.28	6.95
39	33.80	30.41	27.07	27.07	13.52	13.91	6.77
40	32.95	29.65	26.39	26.39	13.18	13.56	6.60
41	32.15	28.92	25.75	25.75	12.86	13.23	6.44
42	31.33	28.23	25.13	25.13	12.55	12.91	6.28
43	30.65	27.58	24.55	24.55	12.26	12.61	6.14
44	29.96	27.86	23.99	23.99	11.98	12.33	6.00
45	29.29	26.35	23.46	23.46	11.71	12.05	5.87
46	28.66	25.78	22.95	22.95	11.46	11.79	5.74
47	28.05	25.23	22.46	22.46	11.21	11.54	5.62
48	27.46	24.70	21.99	21.99	10.98	11.30	5.50
49	26.90	24.20	21.52	21.52	10.76	11.06	5.38
50	26.36	23.72	21.11	21.11	10.54	10.85	5.28
51	25.85	23.25	20.67	20.67	10.34	10.62	5.17
52	25.35	22.80	20.30	20.30	10.14	10.43	5.08
53	24.87	22.37	19.89	19.89	9.95	10.22	4.97
54	24.41	21.96	19.55	19.55	9.76	10.04	4.89
55	23.97	21.56	19.17	19.17	9.58	9.85	4.79
56	23.54	21.17	18.85	18.85	9.41	9.68	4.72
57	23.12	20.80	18.50	18.50	9.25	9.50	4.62
58	22.73	20.44	18.20	18.20	9.09	9.35	4.55
Const's	1318.37	1186.06	1054.27	1054.27	527.35	541.78	263.56

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.67

Whirl  $\frac{1}{8}$  inch Diameter      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	22.34	20.10	17.87	17.87	8.93	9.18	4.47
60	21.97	19.76	17.59	17.59	8.78	9.04	4.40
61	21.61	19.44	17.28	17.28	8.64	8.88	4.32
62	21.26	19.13	17.03	17.03	8.50	8.75	4.26
63	20.92	18.82	16.73	16.73	8.37	8.60	4.18
64	20.59	18.53	16.47	16.47	8.23	8.47	4.12
65	20.28	18.24	16.22	16.22	8.11	8.34	4.06
66	19.97	17.97	15.99	15.99	7.99	8.22	4.00
67	19.67	17.70	15.74	15.74	7.87	8.09	3.93
68	19.38	17.44	15.50	15.50	7.75	7.97	3.88
69	19.10	17.18	15.27	15.27	7.64	7.85	3.82
70	18.83	16.94	15.08	15.08	7.53	7.75	3.77
71	18.56	16.70	14.85	14.85	7.42	7.63	3.71
72	18.31	16.47	14.64	14.64	7.32	7.52	3.66
73	18.05	16.24	14.46	14.46	7.22	7.42	3.61
74	17.81	16.02	14.26	14.26	7.12	7.32	3.57
75	17.57	15.81	14.06	14.06	7.03	7.22	3.51
76	17.34	15.60	13.87	13.87	6.93	7.13	3.47
77	17.12	15.40	13.69	13.69	6.84	7.04	3.42
78	16.90	15.20	13.53	13.53	6.76	6.95	3.38
79	16.68	15.01	13.35	13.35	6.65	6.86	3.34
80	16.47	14.82	13.18	13.18	6.56	6.77	3.29
81	16.27	14.64	13.02	13.02	6.48	6.69	3.25
82	16.07	14.46	12.87	12.87	6.40	6.62	3.20
83	15.88	14.38	12.70	12.70	6.32	6.53	3.16
84	15.69	14.11	12.55	12.55	6.27	6.45	3.14
85	15.51	13.95	12.40	12.40	6.20	6.37	3.10
86	15.32	13.79	12.27	12.27	6.13	6.31	3.07
87	15.15	13.63	12.12	12.12	6.06	6.23	3.03
88	14.98	13.47	11.98	11.98	5.99	6.16	3.00
89	14.81	13.32	11.85	11.85	5.92	6.09	2.96
90	14.64	13.17	11.71	11.71	5.85	6.03	2.93
91	14.48	13.03	11.58		5.79	5.95	2.89
92	14.33	12.89	11.47		5.73	5.89	2.87
93	14.17	12.75	11.34		5.66	5.83	2.82
94	14.02	12.61	11.22		5.61	5.76	2.79
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1318.37	1186.06	1054.27	1054.27	527.35	541.78	263.56

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 Inch Diameter.**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.08  
Whirl 1 inch Diameter.              Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15 T	81.10	72.99	64.88		32.45	33.24	16.22
16	76.05	68.42	60.82		30.42	31.26	15.21
17	71.58	64.40	57.25		28.63	29.42	14.31
18	67.60	60.82	54.07		27.04	27.78	13.52
19	64.05	57.62	51.22		25.62	26.32	12.80
20	60.84	54.74	48.66		24.33	25.05	12.16
21	57.95	52.13	46.34		23.18	23.81	11.59
22	55.31	49.76	44.23		22.12	22.73	11.06
23	52.91	47.60	42.31		21.16	21.74	10.58
24	50.70	45.61	40.55	40.55	20.28	20.84	10.14
25	48.67	43.79	38.93	38.93	19.47	20.00	9.73
26	46.80	42.10	37.43	37.43	18.72	19.23	9.36
27	45.07	40.54	36.04	36.04	18.02	18.52	9.01
28	43.46	39.10	34.76	34.76	17.38	17.86	8.69
29	41.96	37.75	33.56	33.56	16.78	17.24	8.39
30	40.56	36.49	32.44	32.44	16.22	16.67	8.11
31	39.25	35.31	31.39	31.39	15.70	16.13	7.85
32	38.02	34.21	30.41	30.41	15.21	15.63	7.60
33	36.87	33.17	29.49	29.49	14.75	15.15	7.37
34	35.79	32.20	28.62	28.62	14.31	14.71	7.16
35	34.77	31.28	27.80	27.80	13.90	14.29	6.95
36	33.80	30.41	27.03	27.03	13.52	13.89	6.76
37	32.89	29.58	26.30	26.30	13.15	13.52	6.58
38	32.02	28.81	25.61	25.61	12.81	13.16	6.40
39	31.20	28.07	24.95	24.95	12.48	12.82	6.24
40	30.42	27.37	24.33	24.33	12.16	12.50	6.08
41	29.68	26.70	23.74	23.74	11.87	12.20	5.93
42	28.97	26.06	23.17	23.17	11.59	11.90	5.79
43	28.30	25.46	22.63	22.63	11.32	11.63	5.66
44	27.65	24.88	22.12	22.12	11.06	11.37	5.53
45	27.04	24.33	21.63	21.63	10.81	11.11	5.41
46	26.45	23.80	21.16	21.16	10.58	10.87	5.29
47	25.89	23.29	20.71	20.71	10.35	10.64	5.18
48	25.35	22.80	20.27	20.27	10.14	10.42	5.07
49	24.83	22.34	19.86	19.86	9.93	10.22	4.97
50	24.33	21.89	19.46	19.46	9.73	10.00	4.87
51	23.86	21.46	19.08	19.08	9.54	9.81	4.77
52	23.40	21.05	18.71	18.71	9.36	9.62	4.68
53	22.96	20.65	18.36	18.36	9.18	9.44	4.59
54	22.46	20.27	18.02	18.02	9.01	9.22	4.51
55	22.12	19.90	17.68	17.68	8.85	9.09	4.42
56	21.73	19.55	17.38	17.38	8.69	8.93	4.34
57	21.35	19.20	17.05	17.05	8.54	8.77	4.27
58	20.98	18.87	16.78	16.78	8.39	8.62	4.19
Const's	1216.95	1004.82	973.17	973.17	486.78	500.10	243.29

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.      Ratio Cylinder to Whirl 1 to 7.08.

Whirl      1 inch Diameter.      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	20.62	18.55	16.49	16.49	8.25	8.48	4.12
60	20.28	18.24	16.22	16.22	8.11	8.33	4.06
61	19.95	17.94	15.94	15.94	7.98	8.20	3.99
62	19.62	17.65	15.70	15.70	7.85	8.07	3.92
63	19.31	17.37	15.45	15.45	7.72	7.94	3.86
64	19.01	17.10	15.21	15.21	7.60	7.81	3.80
65	18.72	16.84	14.97	14.97	7.48	7.69	3.74
66	18.43	16.58	14.74	14.74	7.37	7.58	3.69
67	18.16	16.34	14.52	14.52	7.26	7.46	3.63
68	17.89	16.10	14.31	14.31	7.15	7.35	3.58
69	17.63	15.86	14.10	14.10	7.05	7.25	3.53
70	17.38	15.64	13.90	13.90	6.95	7.11	3.46
71	17.14	15.42	13.71	13.71	6.85	7.04	3.43
72	16.90	15.20	13.52	13.52	6.76	6.95	3.38
73	16.67	14.91	13.33	13.33	6.66	6.85	3.33
74	16.44	14.79	13.15	13.15	6.57	6.76	3.29
75	16.22	14.59	12.98	12.98	6.49	6.67	3.24
76	16.01	14.40	12.81	12.81	6.40	6.58	3.20
77	15.80	14.21	12.64	12.64	6.32	6.49	3.16
78	15.60	14.03	12.48	12.48	6.24	6.41	3.12
79	15.40	13.85	12.32	12.32	6.16	6.33	3.08
80	15.21	13.68	12.16	12.16	6.08	6.25	3.04
81	15.02	13.51	12.01	12.01	6.00	6.17	3.00
82	14.84	13.35	11.87	11.87	5.93	6.11	2.97
83	14.66	13.19	11.72	11.72	5.86	6.03	2.93
84	14.48	13.03	11.59	11.59	5.79	5.95	2.90
85	14.31	12.88	11.45	11.45	5.72	5.88	2.86
86	14.15	12.73	11.32	11.32	5.66	5.82	2.83
87	14.98	12.58	11.19	11.19	5.59	5.75	2.80
88	14.82	12.44	11.06	11.06	5.53	5.68	2.76
89	13.67	12.30	10.92	10.92	5.46	5.62	2.73
90	13.52	12.16	10.81	10.81	5.40	5.55	2.70
91	13.37	12.03	10.69		5.34	5.50	2.67
92	13.22	11.90	10.58		5.29	5.44	2.64
93	13.08	11.77	10.46		5.23	5.38	2.62
94	12.94	11.64	10.35		5.17	5.32	2.59
	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame	36" Frame
	24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T
	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame	39" Frame
	15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T
Const's	1216.95	1094.82	973.17	973.17	486.78	500.10	243.29

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.      Ratio Cylinder to Whirl 1 to 6.80.

Whirl  $1\frac{1}{8}$  inch Diameter.      Front Roll Gear 108 Teeth.

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	77.92	70.10	62.31		31.16	32.02	15.58
16	73.05	65.78	58.42		29.22	30.02	14.60
17	68.75	61.85	54.98		27.50	28.25	13.75
18	64.93	58.41	57.93		25.97	28.68	12.98
19	61.51	55.34	49.19		24.60	25.28	12.30
20	58.44	52.57	46.73		23.38	24.01	11.68
21	55.65	50.07	44.51		22.26	22.87	11.13
22	53.12	47.79	42.48		21.25	21.83	10.62
23	50.81	45.71	40.64		20.32	20.88	10.16
24	48.70	43.81	38.94	38.94	19.48	20.01	9.74
25	46.75	42.06	37.39	37.39	18.70	19.21	9.35
26	44.95	40.44	35.95	35.95	17.98	18.47	8.99
27	43.29	38.94	34.62	34.62	17.31	17.79	8.65
28	41.74	37.55	33.38	33.38	16.69	17.15	8.34
29	40.30	36.25	32.23	32.23	16.12	16.56	8.06
30	38.96	35.05	31.15	31.15	15.58	16.01	7.79
31	37.70	33.92	30.15	30.15	15.08	15.49	7.54
32	36.52	32.86	29.21	29.21	14.61	15.01	7.30
33	35.41	31.86	28.32	28.32	14.16	14.55	7.08
34	34.37	30.92	27.49	27.49	13.75	14.13	6.87
35	33.39	30.04	26.70	26.70	13.35	13.72	6.68
36	32.46	29.20	25.96	25.96	12.98	13.34	6.49
37	31.59	28.41	25.26	25.26	12.63	12.98	6.32
38	30.75	27.67	24.60	24.60	12.30	12.64	6.15
39	29.97	26.96	23.97	23.97	11.98	12.32	5.99
40	29.22	26.28	23.37	23.37	11.68	12.00	5.84
41	28.50	25.64	22.80	22.80	11.40	11.71	5.70
42	27.82	25.03	22.25	22.25	11.13	11.44	5.56
43	27.18	24.45	21.74	21.74	10.87	11.17	5.43
44	26.56	23.89	21.24	21.24	10.62	10.91	5.31
45	25.97	23.36	20.77	20.77	10.38	10.67	5.19
46	25.40	22.85	20.32	20.32	10.16	10.44	5.08
47	24.86	22.37	19.89	19.89	9.94	10.22	4.97
48	24.35	21.90	19.47	19.47	9.74	10.01	4.87
49	23.85	21.45	19.08	19.08	9.54	9.80	4.77
50	23.37	21.03	18.69	18.69	9.35	9.61	4.67
51	22.91	20.61	18.33	18.33	9.16	9.42	4.58
52	22.47	20.22	17.97	17.97	8.99	9.23	4.49
53	22.05	19.84	17.64	17.64	8.82	9.06	4.41
54	21.64	19.47	17.31	17.31	8.65	8.90	4.33
55	21.25	19.11	16.99	16.99	8.50	8.73	4.25
56	20.87	18.77	16.69	16.69	8.34	8.58	4.17
57	20.50	18.44	16.40	16.40	8.20	8.42	4.10
58	20.15	18.12	16.11	16.11	8.06	8.28	4.03
Const's	1168.83	1051.52	934.69	934.69	467.53	480.32	233.67



# BAND DRIVE

## Spinning Twist Gear Table.

### FRONT ROLL 1 inch Diameter

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 6.80

Whirl  $1\frac{1}{16}$  inch Diameter      Front Roll Gear 108 Teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	19.81	17.82	15.84	15.84	7.92	8.14	3.96
60	19.48	17.52	15.58	15.58	7.79	8.01	3.89
61	19.16	17.23	15.32	15.32	7.66	7.87	3.83
62	18.85	16.96	15.08	15.08	7.54	7.75	3.77
63	18.55	16.69	14.84	14.84	7.42	7.62	3.71
64	18.26	16.43	14.60	14.60	7.30	7.51	3.65
65	17.98	16.17	14.38	14.38	7.19	7.39	3.59
66	17.70	15.93	14.16	14.16	7.08	7.28	3.54
67	17.44	15.69	13.95	13.95	6.97	7.17	3.49
68	17.18	15.46	13.75	13.75	6.87	7.06	3.43
69	16.93	15.23	13.55	13.55	6.77	6.96	3.39
70	16.69	15.02	13.35	13.35	6.67	6.86	3.34
71	16.46	14.81	13.16	13.16	6.58	6.76	3.29
72	16.23	14.60	13.00	13.00	6.49	6.67	3.24
73	16.01	14.40	12.80	12.80	6.40	6.58	3.20
74	15.79	14.21	12.63	12.63	6.31	6.49	3.16
75	15.58	14.02	12.46	12.46	6.23	6.40	3.11
76	15.37	13.83	12.30	12.30	6.15	6.32	3.07
77	15.17	13.65	12.14	12.14	6.07	6.24	3.03
78	14.98	13.48	11.98	11.98	5.99	6.16	3.00
79	14.79	13.31	11.83	11.83	5.91	6.08	2.96
80	14.61	13.14	11.68	11.68	5.84	6.00	2.92
81	14.43	12.98	11.54	11.54	5.77	5.93	2.88
82	14.25	12.82	11.40	11.40	5.70	5.86	2.85
83	14.08	12.66	11.26	11.26	5.63	5.79	2.82
84	13.91	12.51	11.13	11.13	5.56	5.72	2.78
85	13.75	12.37	11.00	11.00	5.50	5.65	2.75
86	13.59	12.22	10.87	10.87	5.43	5.59	2.72
87	13.43	12.08	10.74	10.74	5.37	5.52	2.69
88	13.28	11.94	10.62	10.62	5.31	5.46	2.66
89	13.13	11.81	10.50	10.50	5.25	5.40	2.62
90	12.98	11.68	10.39	10.39	5.19	5.34	2.60
91	12.84	11.55	10.27	10.27	5.13	5.28	2.57
92	12.70	11.42	10.16	10.16	5.08	5.22	2.54
93	12.56	11.30	10.05	10.05	5.02	5.16	2.51
94	12.43	11.18	9.94	9.94	4.97	5.11	2.49
	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
	24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T
	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame
	15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T
Const's	1168.83	1051.52	934.69	934.69	467.53	480.32	233.67

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 6.22.

Whirl 1½ inch Diameter.

Front Roll Gear 108 Teeth.

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	71.27	64.12	57.00		28.51	29.29	14.25
16	66.82	60.11	53.44		26.72	27.46	13.36
17	62.89	56.57	50.29		25.15	25.84	12.57
18	59.39	53.43	47.50		23.75	24.41	11.87
19	56.27	50.62	45.00		22.50	23.12	11.25
20	53.45	48.09	42.75		21.38	21.97	10.69
21	50.91	45.80	40.71		20.36	20.92	10.18
22	48.59	43.71	38.86		19.43	19.97	9.72
23	46.44	41.81	37.17		18.59	19.10	9.29
24	44.54	40.07	35.62	35.62	17.81	18.30	8.91
25	42.76	38.47	34.20	35.20	17.10	17.57	8.55
26	41.12	36.99	32.88	32.88	16.44	16.90	8.22
27	39.59	35.62	31.66	31.66	15.83	16.27	7.92
28	38.18	34.35	30.53	30.53	15.27	15.69	7.63
29	36.86	33.16	29.48	29.48	14.74	15.15	7.37
30	35.63	32.06	28.50	28.50	14.25	14.65	7.12
31	34.48	31.02	27.58	27.58	13.79	14.17	6.89
32	33.41	30.05	26.72	26.72	13.36	13.73	6.68
33	32.59	29.14	25.91	25.91	12.95	13.31	6.48
34	31.44	28.28	25.15	25.15	12.57	12.92	6.29
35	30.54	27.48	24.43	24.43	12.21	12.55	6.11
36	29.69	26.72	23.75	23.75	11.89	12.20	5.94
37	28.89	25.99	23.11	23.11	11.55	11.87	5.78
38	28.13	25.31	22.50	22.50	11.25	11.56	5.62
39	27.41	24.66	21.92	21.92	10.96	11.27	5.48
40	26.72	24.04	21.37	21.37	10.69	10.98	5.34
41	26.07	23.45	20.85	20.85	10.43	10.72	5.21
42	25.45	22.40	20.36	20.36	10.18	10.46	5.09
43	24.86	22.37	19.88	19.88	9.94	10.22	4.97
44	24.29	21.85	19.43	19.43	9.71	9.99	4.86
45	23.75	21.37	19.00	19.00	9.50	9.76	4.75
46	23.24	20.90	18.59	18.59	9.29	9.55	4.65
47	22.74	20.46	18.19	18.19	9.09	9.35	4.55
48	22.27	20.03	17.81	17.81	8.90	9.15	4.45
49	21.81	19.62	17.45	17.45	8.72	8.97	4.36
50	21.38	19.23	17.10	17.10	8.55	8.79	4.27
51	20.96	18.85	16.76	16.76	8.38	8.61	4.19
52	20.56	18.49	16.44	16.44	8.22	8.45	4.11
53	20.17	18.14	16.13	16.13	8.07	8.29	4.03
54	19.79	17.81	15.83	15.83	7.91	8.14	3.96
55	19.43	17.48	15.54	15.54	7.77	7.99	3.89
56	19.09	17.17	15.27	15.27	7.63	7.85	3.82
57	18.75	16.87	15.00	15.00	7.50	7.71	3.76
58	18.43	16.58	14.74	14.74	7.37	7.58	3.68
Const's	1069.13	961.83	854.96	854.96	427.65	439.35	213.74



# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 6.22.

Whirl 1½ inch Diameter.

Front Roll Gear 108 Teeth.

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	18.12	16.30	14.49	14.49	7.24	7.45	3.62
60	17.81	16.03	14.25	14.25	7.12	7.32	3.57
61	17.52	15.76	14.01	14.01	7.01	7.20	3.50
62	17.24	15.51	13.79	13.79	6.90	7.09	3.45
63	16.97	15.26	13.57	13.57	6.78	6.97	3.39
64	16.70	15.02	13.36	13.36	6.68	6.86	3.34
65	16.44	14.79	13.15	13.15	6.58	6.76	3.29
66	16.19	14.57	12.95	12.95	6.48	6.66	3.24
67	15.95	14.35	12.76	12.76	6.38	6.56	3.19
68	15.72	14.14	12.57	12.57	6.28	6.46	3.14
69	15.49	13.93	12.39	12.39	6.20	6.37	3.10
70	15.27	13.74	12.21	12.21	6.10	6.28	3.05
71	15.05	13.54	12.04	12.04	6.02	6.19	3.01
72	14.88	13.35	11.87	11.87	5.94	6.10	2.97
73	14.64	13.17	11.71	11.71	5.84	6.02	2.92
74	14.44	12.99	11.55	11.55	5.78	5.94	2.89
75	14.25	12.82	11.40	11.40	5.70	5.86	2.85
76	14.06	12.65	11.25	11.25	5.62	5.78	2.81
77	13.88	12.49	11.10	11.10	5.55	5.71	2.78
78	13.70	12.33	10.96	10.96	5.48	5.63	2.74
79	13.53	12.17	10.82	10.82	5.41	5.56	2.71
80	13.36	12.02	10.69	10.69	5.34	5.49	2.67
81	13.19	11.87	10.56	10.56	5.27	5.42	2.64
82	13.03	11.72	10.43	10.43	5.21	5.36	2.61
83	12.88	11.58	10.30	10.30	5.15	5.29	2.58
84	12.72	11.45	10.18	10.18	5.09	5.23	2.54
85	12.57	11.31	10.06	10.06	5.03	5.17	2.51
86	12.43	11.18	9.94	9.94	4.97	5.11	2.49
87	12.28	11.05	9.83	9.83	4.91	5.05	2.46
88	12.14	10.92	9.72	9.72	4.85	4.99	2.43
89	12.01	10.80	9.61	9.61	4.80	4.94	2.40
90	11.87	10.68	9.50	9.50	4.75	4.88	2.37
91	11.74	10.56	9.40		4.69	4.83	2.34
92	11.62	10.45	9.29		4.64	4.78	2.32
93	11.49	10.34	9.19		4.59	4.72	2.30
94	11.37	10.23	9.10		4.54	4.67	2.27
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame	36'' Frame
24-94 T	30-94 T	30-94 T	40-88 T	15-94 T	28-94 T	30-94 T	
39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	39'' Frame	
15-70 T	15-86 T	15-86 T	24-90 T	15-94 T	15-94 T	15-94 T	
Const's	1069.13	961.83	854.96	854.96	427.65	439.35	213.74

# BAND DRIVE

## Spinning Twist Gear Table.

**FRONT ROLL 1 inch Diameter**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 5.48  
 Whirl 1  $\frac{5}{16}$  inch Diameter.      Front Roll Gear 108 Teeth

Change	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
Gears	Twist	Twist	Twist	Twist	Twist	Twist	Twist
15T	62.79	56.49	50.22		25.10	25.80	12.55
16	58.87	52.96	47.08		23.54	24.19	11.77
17	55.40	49.84	44.31		22.16	22.77	11.08
18	52.33	47.07	41.85		20.93	21.50	10.46
19	49.57	44.60	39.64		19.83	20.37	9.91
20	47.09	42.37	37.66		18.83	19.35	9.41
21	44.85	40.35	35.87		17.94	18.43	8.97
22	42.81	38.51	34.24		17.12	17.59	8.56
23	40.95	36.84	32.75		16.37	16.83	8.19
24	39.24	35.30	31.38	31.38	15.69	16.13	7.85
25	37.67	33.89	30.13	30.13	15.07	15.48	7.53
26	36.22	32.59	28.97	28.97	14.49	14.89	7.24
27	34.88	31.38	27.90	27.90	13.95	14.34	6.97
28	33.64	30.26	26.90	26.90	13.45	13.82	6.72
29	32.48	29.22	25.97	25.97	12.99	13.35	6.49
30	31.39	28.24	25.11	25.11	12.55	12.90	6.28
31	30.38	27.33	24.30	24.30	12.15	12.49	6.07
32	29.43	26.48	23.54	23.54	11.77	12.10	5.88
33	28.54	25.67	22.83	22.83	11.41	11.73	5.74
34	27.70	24.92	22.15	22.15	11.08	11.38	5.54
35	26.91	24.21	21.52	21.52	10.76	11.06	5.38
36	26.16	23.53	20.92	20.92	10.46	10.75	5.23
37	25.45	22.90	20.33	20.36	10.18	10.46	5.09
38	24.78	22.30	19.82	19.82	9.91	10.19	4.96
39	24.15	21.72	19.31	19.31	9.66	9.93	4.83
40	23.54	21.18	18.83	18.83	9.41	9.68	4.71
41	22.97	20.66	18.37	18.37	9.18	9.44	4.59
42	22.40	20.17	17.93	17.93	8.97	9.22	4.48
43	21.90	19.70	17.52	17.52	8.76	9.01	4.38
44	21.40	19.25	17.12	17.12	8.56	8.80	4.28
45	20.93	18.83	16.74	16.74	8.37	8.60	4.18
46	20.47	18.42	16.37	16.37	8.19	8.41	4.09
47	20.04	18.03	16.03	16.03	8.01	8.24	4.01
48	19.62	17.65	15.69	15.69	7.84	8.06	3.92
49	19.22	17.29	15.37	15.37	7.68	7.90	3.84
50	18.83	16.94	15.06	15.06	7.53	7.74	3.77
51	18.46	16.61	14.77	14.77	7.38	7.59	3.69
52	18.11	16.29	14.49	14.49	7.24	7.44	3.62
53	17.77	15.98	14.21	14.21	7.10	7.30	3.55
54	17.44	15.69	13.95	13.95	6.97	7.17	3.49
55	17.12	15.40	13.70	13.70	6.85	7.04	3.42
56	16.82	15.13	13.45	13.45	6.72	6.91	3.36
57	16.52	14.86	13.21	13.21	6.61	6.79	3.30
58	16.24	14.61	12.99	12.99	6.49	6.67	3.25
Const's	941.94	847.40	753.25	753.25	376.77	387.08	188.31

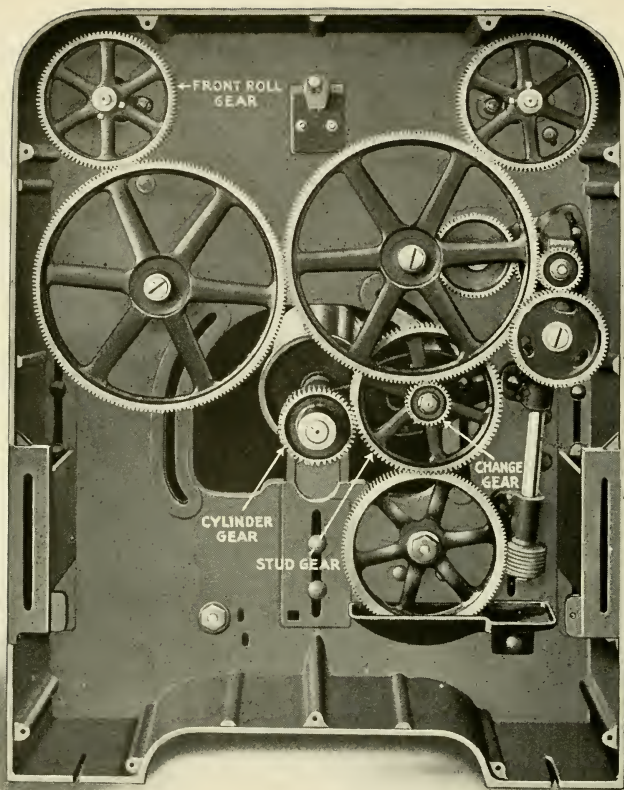
# BAND DRIVE Spinning Twist Gear Table

**FRONT ROLL 1 inch Diameter**

Cylinder 8 inches diameter.      Ratio Cylinder to Whirl 1 to 5.48

Whirl 1  $\frac{5}{16}$  inch diameter.      Front Roll gear 108 teeth

Change Gears	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 90 T	Cyl. 22 T Stud 88 T	Cyl. 20 T Stud 80 T	Cyl. 40 T Stud 80 T	Cyl. 36 T Stud 74 T	Cyl. 55 T Stud 55 T
	Twist	Twist	Twist	Twist	Twist	Twist	Twist
59T	15.96	14.36	12.77	12.77	6.38	6.56	3.19
60	15.69	14.12	12.55	12.55	6.27	6.45	3.14
61	15.44	13.89	12.35	12.35	6.17	6.35	3.09
62	15.19	13.66	12.15	12.15	6.07	6.24	3.04
63	14.94	13.45	11.96	11.96	5.98	6.14	2.99
64	14.71	13.24	11.77	11.77	5.88	6.05	2.94
65	14.49	13.03	11.59	11.59	5.79	5.96	2.90
66	14.27	12.84	11.41	11.41	5.70	5.86	2.85
67	14.05	12.64	11.24	11.24	5.62	5.78	2.81
68	13.85	12.46	11.08	11.08	5.54	5.69	2.77
69	13.65	12.28	10.92	10.92	5.46	5.61	2.73
70	13.45	12.10	10.76	10.76	5.38	5.53	2.69
71	13.26	11.93	10.61	10.61	5.30	5.45	2.65
72	13.08	11.77	10.46	10.46	5.23	5.38	2.62
73	12.90	11.60	10.32	10.32	5.16	5.30	2.58
74	12.72	11.45	10.18	10.18	5.09	5.23	2.54
75	12.55	11.29	10.04	10.04	5.02	5.16	2.51
76	12.39	11.15	9.91	9.91	4.95	5.09	2.48
77	12.23	11.00	9.78	9.78	4.89	5.03	2.45
78	12.07	10.86	9.66	9.66	4.82	4.96	2.41
79	11.92	10.72	9.53	9.53	4.76	4.90	2.38
80	11.77	10.59	9.42	9.42	4.70	4.84	2.35
81	11.62	10.46	9.30	9.30	4.65	4.78	2.32
82	11.48	10.33	9.19	9.19	4.59	4.72	2.30
83	11.34	10.20	9.08	9.08	4.53	4.66	2.27
84	11.21	10.08	8.97	8.97	4.48	4.61	2.24
85	11.08	9.96	8.86	8.86	4.43	4.55	2.22
86	10.95	9.85	8.76	8.76	4.38	4.50	2.19
87	10.82	9.74	8.66	8.66	4.33	4.45	2.16
88	10.70	9.62	8.56	8.56	4.28	4.40	2.14
89	10.58	9.52	8.46	8.46	4.23	4.35	2.12
90	10.46	9.41	8.37	8.37	4.18	4.30	2.09
91	10.35	9.31	8.28		4.14	4.25	2.07
92	10.23	9.21	8.19		4.09	4.21	2.05
93	10.12	9.11	8.10		4.05	4.16	2.02
94	10.02	9.01	8.01		4.00	4.12	2.00
Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears	Change Gears
36'' Frame 24-94 T	36'' Frame 30-94 T	36'' Frame 30-94 T	36'' Frame 40-88 T	36'' Frame 15-94 T	36'' Frame 28-94 T	36'' Frame 30-94 T	
39'' Frame 15-70 T	39'' Frame 15-86 T	39'' Frame 15-86 T	39'' Frame 24-90 T	39'' Frame 15-94 T	39'' Frame 15-94 T	39'' Frame 15-94 T	
Const's	941.94	847.40	753.25	753.25	376.77	387.08	188.31



### Tape Drive Spinning Frame Twist Gearing

*Formula for figuring twist:*

C = Cylinder Gear.

S = Stud Gear.

T = Change Gear.

$$\frac{F \times S \times R}{C \times T \times D} = \text{Twist per inch.}$$

$$\frac{\text{Twist Constant}}{\text{Change Gear}} = \text{Twist per inch.}$$

F = Front Roll Gear.

R = Ratio Whirl to Cylinder.

D = Circumference of Front Roll.

$$\frac{F \times S \times R}{C \times D} = \text{Twist Constant.}$$

$$\frac{\text{Twist Constant}}{\text{Twist per inch.}} = \text{Change Gear.}$$

# TAPE DRIVE

## TWIST GEARING CONSTANTS FOR WHITIN SPINNING FRAME

8 Inch Cylinder											
Front Roll 1 in. Dia.				Front Roll Gear 100 T				Front Roll Gear 100 T			
Diameter of Whirl	Ratio Whirl to Cylinder	7 Inch Cylinder		Ratio Whirl to Cylinder	Front Roll Gear 100 T		Ratio Whirl to Cylinder	Front Roll Gear 100 T		Ratio Whirl to Cylinder	Front Roll Gear 100 T
		Const's	Cyl. 26 T	Const's	Cyl. 26 T	Stud 112 T	Const's	Cyl. 26 T	Stud 112 T	Const's	Cyl. 26 T
$\frac{7}{16}$ in.	7.80	1260.50	1069.51	878.53	496.56	248.28	1422.10	1206.63	991.16	560.22	280.11
$1\frac{1}{16}$ in.	7.27	1174.85	996.84	818.84	462.82	231.41	1341.30	1138.08	934.85	528.39	264.19
$1\frac{1}{8}$ in.	6.81	1100.52	933.77	767.02	433.53	216.76	1260.50	1069.51	878.53	496.56	248.28
$1\frac{3}{8}$ in.	6.43	1038.52	881.66	724.22	409.34	204.67	1179.70	1000.96	822.21	464.73	232.36
$1\frac{1}{2}$ in.	6.09	984.17	835.40	685.93	387.70	193.85	1131.22	959.82	788.42	445.63	222.81
$1\frac{5}{8}$ in.	5.22	843.56	715.75	587.94	332.31	166.16	953.46	808.99	664.53	375.60	187.80
Front Roll $1\frac{1}{8}$ in. Dia. Front Roll Gear 100 T.											
Diameter of Whirl	Ratio Whirl to Cylinder	7 Inch Cylinder		Ratio Whirl to Cylinder	Front Roll Gear 100 T		Ratio Whirl to Cylinder	Front Roll Gear 100 T		Ratio Whirl to Cylinder	Front Roll Gear 100 T
		Const's	Cyl. 26 T	Const's	Cyl. 26 T	Stud 112 T					
$\frac{7}{16}$ in.	7.80	1120.41	950.08	780.90	441.38	220.69	1264.09	1072.57	881.04	497.97	248.99
$1\frac{1}{16}$ in.	7.27	1044.31	886.08	727.85	411.39	205.69	1192.27	1011.62	830.95	469.67	234.84
$1\frac{1}{8}$ in.	6.81	978.24	830.02	681.81	385.37	192.68	1120.46	950.68	780.92	441.38	220.69
$1\frac{3}{8}$ in.	6.43	923.64	783.70	643.75	363.86	181.93	1048.62	889.74	730.86	413.09	206.54
$1\frac{1}{2}$ in.	6.09	874.79	742.26	609.71	344.62	172.31	1005.53	853.18	700.82	396.12	198.06
$1\frac{5}{8}$ in.	5.22	749.84	636.23	522.61	295.39	147.69	847.51	719.11	590.69	333.87	166.93

Rule to find Change Gear:—Divide Constant by Twist per Inch Required.

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	84.03	71.30	58.56	33.10	16.55
16	78.78	66.84	54.90	31.03	15.51
17	74.14	62.91	52.03	29.20	14.60
18	70.02	59.41	48.80	27.58	13.78
19	66.34	56.29	46.23	26.13	13.06
20	63.02	53.47	43.92	24.82	12.41
21	60.02	50.92	41.83	23.64	11.82
22	57.29	48.61	39.93	22.57	11.28
23	54.80	46.50	38.19	21.41	10.79
24	52.52	44.56	36.60	20.69	10.34
25	50.42	42.78	35.14	19.86	9.93
26	48.48	41.13	33.79	19.09	9.54
27	46.68	39.61	32.53	18.39	9.19
28	45.01	38.25	31.37	17.73	8.86
29	43.47	36.88	30.29	17.12	8.56
30	42.01	35.65	29.28	16.55	8.27
31	40.66	34.50	28.34	16.01	8.00
32	39.38	33.42	27.45	15.51	7.75
33	38.19	32.40	26.63	15.04	7.52
34	37.07	31.45	25.83	14.60	7.30
35	36.01	30.54	25.10	14.18	7.09
36	35.01	29.70	24.40	13.79	6.89
37	34.06	28.90	23.74	13.42	6.71
38	33.17	28.14	23.11	13.06	6.53
39	32.32	27.42	22.52	12.73	6.37
40	31.51	26.73	21.96	12.41	6.20
41	30.74	26.08	21.42	12.11	6.05
42	30.01	25.46	20.91	11.82	5.91
43	29.31	24.87	20.43	11.54	5.77
44	28.65	24.30	19.96	11.28	5.64
45	28.01	23.76	19.52	11.03	5.51
46	27.40	23.25	19.09	10.79	5.39
47	26.82	22.75	18.69	10.71	5.28
48	26.26	22.28	18.30	10.34	5.17
49	25.72	21.82	17.92	10.13	5.06
50	25.21	21.39	17.57	9.93	4.96
51	24.71	20.97	17.22	9.69	4.86
52	24.24	20.56	16.89	9.54	4.77
53	23.78	20.17	16.57	9.36	4.68
54	23.34	19.80	16.26	9.19	4.59
55	22.91	19.44	15.97	9.02	4.51
56	22.50	19.12	15.68	8.86	4.43
57	22.11	18.76	15.41	8.71	4.35
58	21.73	18.44	15.14	8.56	4.28
Const's	1260.50	1069.51	878.53	496.56	248.28



# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	21.36	18.12	14.89	8.41	4.20
60	21.00	17.82	14.64	8.27	4.13
61	20.61	17.53	14.40	8.14	4.07
62	20.33	17.25	14.17	8.00	4.00
63	20.00	16.94	13.92	7.88	3.94
64	19.69	16.71	13.72	7.75	3.87
65	19.39	16.45	13.51	7.63	3.81
66	19.09	16.20	13.31	7.52	3.76
67	18.81	15.96	13.11	7.41	3.70
68	18.52	15.72	12.91	7.30	3.65
69	18.26	15.50	12.73	7.19	3.59
70	18.00	15.27	12.55	7.09	3.54
71	17.75	15.06	12.37	6.99	3.49
72	17.50	14.85	12.20	6.89	3.44
73	17.26	14.65	12.03	6.80	3.40
74	17.03	14.45	11.87	6.71	3.35
75	16.80	14.26	11.71	6.62	3.31
76	16.58	14.07	11.55	6.53	3.26
77	16.37	13.88	11.40	6.44	3.22
78	16.16	13.71	11.26	6.36	3.18
79	15.95	13.53	11.10	6.28	3.14
80	15.75	13.36	10.98	6.20	3.10
81	15.56	13.20	10.84	6.13	3.06
82	15.37	13.04	10.71	6.05	3.02
83	15.18	12.88	10.58	5.98	2.99
84	15.00	12.75	10.45	5.91	2.95
85	14.82	12.58	10.33	5.81	2.92
86	14.65	12.43	10.21	5.77	2.88
87	14.48	12.29	10.09	5.70	2.85
88	14.31	12.15	9.98	5.64	2.82
89	14.16	12.01	9.87	5.57	2.78
90	14.00	11.88	9.76	5.51	2.74
91	13.85	11.75	9.65	5.45	2.72
92	13.70	11.62	9.54	5.39	2.69
93	13.55	11.50	9.44	5.33	2.66
94	13.41	11.37	9.34	5.28	2.64
96	13.13	11.14	9.15	5.17	2.58
98	12.86	10.97	8.95	5.06	2.53
100	12.60	10.69	8.78	4.96	2.48
102	12.35	10.48	8.61	4.86	2.43
104	12.11	10.28	8.44	4.77	2.38
106	11.89	10.08	8.28	4.68	2.34
108	11.67	9.90	8.13	4.59	2.29
110	11.45	9.72	7.98	4.51	2.25
Const's	1260.50	1069.51	878.53	496.56	248.28

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.27

Whirl  $\frac{15}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	78.32	66.45	54.58	30.85	15.42
16	73.43	62.30	51.17	28.92	14.46
17	69.11	58.63	48.16	27.22	13.61
18	65.27	55.33	45.49	25.71	12.85
19	61.83	52.42	43.09	24.35	12.17
20	58.74	49.84	40.94	23.14	11.53
21	55.95	47.43	38.99	22.03	11.01
22	53.40	45.31	37.22	21.03	10.51
23	51.08	43.34	35.60	20.12	10.06
24	48.95	41.53	34.11	19.28	9.64
25	46.99	39.84	32.75	18.51	9.25
26	45.19	38.32	31.49	17.80	8.90
27	43.51	36.92	30.36	17.20	8.56
28	41.95	35.60	29.28	16.52	8.27
29	40.51	34.37	28.23	15.95	7.99
30	39.16	33.23	27.29	15.43	7.71
31	37.90	32.15	26.40	14.92	7.45
32	36.71	31.15	25.58	14.46	7.23
33	35.60	30.20	24.82	14.02	7.01
34	34.55	29.31	24.08	13.61	6.80
35	33.56	28.48	23.38	13.22	6.61
36	32.63	27.67	22.74	12.86	6.43
37	31.75	26.94	22.14	12.50	6.25
38	30.93	26.21	21.54	12.18	6.09
39	30.12	25.56	20.98	11.86	5.93
40	29.37	24.92	20.47	11.57	5.77
41	28.65	24.31	19.96	11.30	5.64
42	27.97	23.72	19.49	11.02	5.51
43	27.32	23.18	19.04	10.76	5.38
44	26.70	22.65	18.61	10.52	5.26
45	26.10	22.15	18.18	10.28	5.14
46	25.54	21.62	17.80	10.06	5.03
47	24.99	21.20	17.42	9.84	4.92
48	24.47	20.77	17.06	9.64	4.82
49	23.97	20.34	16.70	9.46	4.72
50	23.49	19.92	16.38	9.28	4.62
51	23.03	19.56	16.08	9.08	4.54
52	22.59	19.16	15.78	8.92	4.44
53	22.16	18.80	15.44	8.74	4.36
54	21.75	18.46	15.18	8.60	4.28
55	21.36	18.14	14.90	8.44	4.20
56	20.98	17.80	14.64	8.38	4.13
57	20.61	17.48	14.39	8.12	4.06
58	20.25	17.18	14.14	7.96	3.99
Const's	1174.85	996.84	818.84	462.82	231.41



# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter      Ratio Cylinder to Whirl 1 to 7.27  
 Whirl  $\frac{15}{16}$  inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	19.91	16.89	13.89	7.83	3.92
60	19.58	16.62	13.64	7.71	3.85
61	19.26	16.34	13.41	7.58	3.79
62	18.95	16.07	13.20	7.46	3.73
63	18.65	15.81	12.99	7.34	3.67
64	18.35	15.57	12.79	7.23	3.63
65	18.07	15.33	12.58	7.12	3.56
66	17.80	15.10	12.41	7.01	3.50
67	17.53	14.87	12.22	6.90	3.45
68	17.27	14.65	12.04	6.80	3.40
69	17.02	14.44	11.87	6.70	3.35
70	16.78	14.24	11.69	6.61	3.31
71	16.54	14.04	11.53	6.52	3.26
72	16.32	13.83	11.37	6.43	3.21
73	16.09	13.65	11.22	6.34	3.17
74	15.87	13.47	11.07	6.25	3.13
75	15.66	13.25	10.92	6.17	3.08
76	15.45	13.14	10.77	6.09	3.04
77	15.26	12.94	10.63	6.01	3.00
78	15.06	12.78	10.49	5.93	2.96
79	14.87	12.61	10.36	5.86	2.93
80	14.68	12.46	10.24	5.79	2.89
81	14.50	12.30	10.11	5.72	2.85
82	14.33	12.16	9.98	5.65	2.82
83	14.15	12.01	9.86	5.58	2.78
84	13.98	11.86	9.74	5.51	2.75
85	13.82	11.71	9.63	5.44	2.72
86	13.66	11.59	9.52	5.38	2.69
87	13.50	11.46	9.41	5.32	2.66
88	13.35	11.33	9.31	5.26	2.63
89	13.20	11.20	9.20	5.20	2.60
90	13.05	11.08	9.09	5.14	2.57
91	12.91	10.94	8.99	5.08	2.54
92	12.77	10.81	8.90	5.03	2.52
93	12.63	10.70	8.80	4.97	2.49
94	12.49	10.60	8.71	4.92	2.46
96	12.24	10.38	8.53	4.82	2.41
98	11.99	10.17	8.35	4.73	2.36
100	11.74	9.96	8.19	4.64	2.31
102	11.52	9.78	8.04	4.54	2.27
104	10.29	9.58	7.89	4.46	2.22
106	10.10	9.40	7.72	4.37	2.18
108	9.90	9.23	7.59	4.30	2.14
110	9.69	9.07	7.45	4.22	2.10
Const's	1174.85	996.84	818.84	462.82	231.41

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter  
Whirl 1 inch Diameter

Ratio Cylinder to Whirl 1 to 6.81  
Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	73.36	66.25	51.13	28.90	14.45
16	68.78	62.11	47.94	27.09	13.54
17	64.73	58.46	45.11	25.50	12.75
18	61.14	55.21	42.61	24.08	12.04
19	57.92	52.30	40.37	22.81	11.40
20	55.02	49.68	38.35	21.67	10.83
21	52.40	47.32	36.52	20.65	10.32
22	50.02	45.17	34.86	19.70	9.85
23	47.85	43.20	33.34	18.85	9.42
24	45.85	41.40	31.96	18.06	9.03
25	44.02	39.75	30.68	17.34	8.67
26	42.33	38.22	29.50	16.68	8.34
27	40.76	36.80	28.41	16.06	8.03
28	39.30	35.49	27.39	15.48	7.74
29	37.95	34.27	26.45	14.93	7.46
30	36.68	33.12	25.56	14.45	7.22
31	35.50	32.06	24.76	13.98	6.99
32	34.39	31.05	23.97	13.54	6.77
33	33.41	30.11	23.24	13.12	6.56
34	32.36	29.23	22.55	12.75	6.37
35	31.44	28.39	21.91	12.38	6.19
36	30.57	27.60	21.30	12.04	6.02
37	29.74	26.86	20.73	11.71	5.85
38	28.96	26.15	20.18	11.40	5.70
39	28.22	25.48	19.66	11.11	5.55
40	27.51	24.89	19.17	10.83	5.41
41	26.84	24.24	18.70	10.57	5.28
42	26.20	23.66	18.26	10.32	5.16
43	25.59	23.11	17.84	10.08	5.04
44	25.01	22.58	17.43	9.85	4.97
45	24.45	22.08	17.04	9.63	4.86
46	23.92	21.60	16.67	9.42	4.71
47	23.41	21.14	16.32	9.22	4.61
48	22.92	20.70	15.98	9.03	4.51
49	22.45	20.28	15.65	8.84	4.42
50	22.01	19.87	15.34	8.67	4.32
51	21.58	19.48	15.04	8.50	4.25
52	21.16	19.11	14.75	8.33	4.16
53	20.76	18.74	14.47	8.18	4.09
54	20.38	18.40	14.20	8.03	4.01
55	20.01	18.07	13.94	7.88	3.94
56	19.65	17.74	13.66	7.74	3.87
57	19.31	17.43	13.45	7.60	3.80
58	18.97	17.13	13.22	7.46	3.73
Const's	1100.52	993.77	767.02	433.53	216.76

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter      Ratio Cylinder to Whirl 1 to 6.81  
 Whirl 1 inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	18.65	16.84	13.00	7.34	3.67
60	18.34	16.56	12.78	7.22	3.61
61	18.04	16.29	12.57	7.10	3.55
62	17.75	16.03	12.38	6.99	3.49
63	17.47	15.77	12.17	6.88	3.44
64	17.19	15.52	11.98	6.77	3.38
65	16.93	15.35	11.80	6.67	3.33
66	16.70	15.05	11.62	6.56	3.28
67	16.42	14.83	11.45	6.47	3.23
68	16.18	14.61	11.28	6.37	3.18
69	15.95	14.40	11.11	6.28	3.14
70	15.72	14.19	10.95	6.19	3.09
71	15.50	13.99	10.80	6.10	3.05
72	15.28	13.80	10.65	6.02	3.01
73	15.08	13.61	10.50	5.93	2.96
74	14.87	13.43	10.36	5.85	2.92
75	14.67	13.25	10.23	5.78	2.89
76	14.48	13.07	10.09	5.70	2.85
77	14.30	12.90	9.96	5.63	2.81
78	14.11	12.74	9.83	5.55	2.77
79	13.93	12.58	9.71	5.48	2.74
80	13.75	12.44	9.58	5.41	2.70
81	13.58	12.26	9.48	5.35	2.67
82	13.42	12.12	9.35	5.28	2.64
83	13.25	11.97	9.24	5.21	2.60
84	13.10	11.83	9.13	5.16	2.58
85	12.95	11.69	9.02	5.10	2.55
86	12.79	11.55	8.94	5.04	2.52
87	12.65	11.42	8.81	4.98	2.49
88	12.50	11.29	8.71	4.92	2.46
89	12.36	11.17	8.61	4.87	2.43
90	12.22	11.04	8.52	4.81	2.40
91	12.09	10.92	8.43	4.76	2.38
92	11.96	10.80	8.33	4.71	2.35
93	11.83	10.68	8.24	4.66	2.33
94	11.70	10.57	8.16	4.61	2.30
96	11.41	10.35	7.99	4.51	2.25
98	11.22	10.14	7.82	4.42	2.21
100	11.00	9.93	7.67	4.33	2.16
102	10.79	9.74	7.52	4.25	2.12
104	10.58	9.55	7.37	4.16	2.08
106	10.38	9.37	7.23	4.09	2.04
108	10.19	9.20	7.10	4.01	2.00
110	10.00	9.03	6.97	3.94	1.97
Const's	1100.52	993.77	767.02	433.53	216.76

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.43

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
Gears	Twist	Twist	Twist	Twist	Twist
15T	69.23	58.77	48.28	27.29	13.64
16	64.90	55.10	45.26	25.58	12.79
17	61.09	51.86	42.60	24.07	12.04
18	57.69	48.98	40.23	22.74	11.37
19	54.65	46.40	38.11	21.54	10.77
20	51.92	44.08	36.21	20.46	10.23
21	49.45	41.98	34.48	19.49	9.74
22	47.20	40.08	32.91	18.60	9.30
23	45.15	38.33	31.48	17.79	8.89
24	43.27	36.73	30.17	17.05	8.52
25	41.54	35.26	28.96	16.37	8.18
26	39.94	33.91	27.85	15.74	7.87
27	38.46	32.65	26.82	15.16	7.58
28	37.09	31.48	25.86	14.61	7.31
29	35.81	30.40	24.97	14.11	7.05
30	34.61	29.38	24.14	13.64	6.82
31	33.50	28.44	23.36	13.20	6.60
32	32.45	27.55	22.63	12.79	6.39
33	31.47	26.71	21.94	12.40	6.20
34	30.54	25.93	21.30	12.03	6.02
35	29.67	25.19	20.69	11.69	5.84
36	28.84	24.49	20.11	11.37	5.68
37	28.06	23.82	19.57	11.06	5.53
38	27.32	23.20	19.05	10.77	5.38
39	26.62	22.60	18.57	10.49	5.24
40	25.96	22.04	18.10	10.23	5.11
41	25.33	21.50	17.66	9.98	4.99
42	24.72	20.99	17.24	9.74	4.87
43	24.15	20.50	16.84	9.52	4.76
44	23.60	20.04	16.45	9.30	4.65
45	23.07	19.59	16.09	9.09	4.54
46	22.57	19.16	15.74	8.89	4.44
47	22.09	18.75	15.40	8.71	4.35
48	21.63	18.36	15.08	8.52	4.26
49	21.19	17.99	14.78	8.35	4.17
50	20.77	17.63	14.48	8.18	4.09
51	20.36	17.28	14.20	8.02	4.01
52	19.97	16.95	13.92	7.87	3.93
53	19.59	16.63	13.66	7.72	3.86
54	19.23	16.32	13.41	7.58	3.79
55	18.88	16.03	13.16	7.44	3.72
56	18.54	15.74	12.93	7.30	3.65
57	18.21	15.46	12.70	7.18	3.59
58	17.90	15.20	12.48	7.05	3.52
Const's	1038.52	881.66	724.22	409.34	204.67

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.43

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	17.60	14.94	12.27	6.93	3.46
60	17.30	14.69	12.07	6.82	3.41
61	17.02	14.45	11.87	6.71	3.35
62	16.75	14.22	11.68	6.60	3.30
63	16.48	13.99	11.49	6.49	3.24
64	16.22	13.77	11.31	6.39	3.19
65	15.97	13.56	11.14	6.29	3.14
66	15.73	13.35	10.97	6.20	3.10
67	15.50	13.15	10.80	6.10	3.05
68	15.27	12.96	10.65	6.01	3.01
69	15.50	12.77	10.49	5.93	2.96
70	14.83	12.59	10.34	5.84	2.92
71	14.62	12.41	10.20	5.76	2.88
72	14.42	12.24	10.05	5.68	2.84
73	14.22	12.07	9.92	5.60	2.80
74	14.03	11.91	9.78	5.53	2.76
75	13.84	11.75	9.65	5.45	2.72
76	13.66	11.60	9.52	5.38	2.69
77	13.48	11.45	9.40	5.31	2.65
78	13.31	11.30	9.28	5.24	2.62
79	13.14	11.16	9.16	5.18	2.59
80	12.98	11.02	9.05	5.11	2.55
81	12.82	10.88	8.94	5.05	2.52
82	12.66	10.75	8.83	4.99	2.49
83	12.51	10.62	8.72	4.93	2.46
84	12.36	10.49	8.62	4.87	2.43
85	12.21	10.37	8.52	4.81	2.40
86	12.07	10.25	8.42	4.76	2.38
87	11.93	10.13	8.32	4.70	2.35
88	11.80	10.02	8.22	4.65	2.32
89	11.66	9.90	8.13	4.59	2.29
90	11.53	9.79	8.04	4.54	2.27
91	11.41	9.68	7.95	4.49	2.24
92	11.28	9.58	7.87	4.44	2.22
93	11.16	9.48	7.78	4.40	2.20
94	11.04	9.37	7.70	4.35	2.17
96	10.81	9.18	7.54	4.26	2.13
98	10.59	8.99	7.39	4.17	2.08
100	10.38	8.81	7.24	4.09	2.04
102	10.18	8.64	7.10	4.01	2.00
104	9.98	8.47	6.96	3.93	1.96
106	9.79	8.31	6.83	3.86	1.93
108	9.61	8.16	6.70	3.79	1.89
110	9.44	8.01	6.58	3.72	1.86
Const's	1038.52	881.66	724.22	409.34	204.67

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter      Ratio Cylinder to Whirl 1 to 6.09  
 Whirl  $1\frac{1}{8}$  inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	65.61	55.69	45.72	25.84	12.92
16	61.51	52.21	42.87	24.23	12.11
17	57.89	49.14	40.34	22.80	11.40
18	54.67	46.41	38.10	21.53	10.76
19	51.79	43.96	36.10	20.40	10.20
20	49.21	41.77	34.29	19.38	9.69
21	46.87	39.78	32.66	18.46	9.23
22	44.74	37.97	31.17	17.61	8.80
23	42.79	36.32	29.82	16.85	8.42
24	41.00	34.80	28.58	16.15	8.07
25	39.37	33.41	27.43	15.50	7.75
26	37.85	32.13	26.38	14.91	7.45
27	36.45	30.94	25.40	14.35	7.17
28	35.14	29.83	24.49	13.84	6.92
29	33.93	28.80	23.65	13.36	6.68
30	32.80	27.84	22.86	12.92	6.46
31	31.75	26.94	22.12	12.50	6.25
32	30.76	26.10	21.43	12.11	6.05
33	29.82	25.31	20.78	11.74	5.87
34	28.95	24.62	20.17	11.45	5.72
35	28.11	23.86	19.59	11.07	5.53
36	27.34	23.20	19.05	10.77	5.38
37	26.59	22.57	18.53	10.47	5.23
38	25.85	21.98	18.05	10.20	5.10
39	25.23	21.42	17.58	9.94	4.97
40	24.60	20.88	17.14	9.69	4.84
41	24.00	20.37	16.73	9.45	4.72
42	23.43	19.89	16.33	9.23	4.61
43	22.88	19.42	15.95	9.01	4.50
44	22.38	18.98	15.58	8.80	4.40
45	21.87	18.56	15.24	8.61	4.30
46	21.40	18.16	14.91	8.42	4.21
47	20.93	17.77	14.59	8.24	4.12
48	20.50	17.40	14.29	8.07	4.03
49	20.08	17.04	13.99	7.91	3.95
50	19.68	16.70	13.71	7.75	3.87
51	19.28	16.38	13.44	7.60	3.80
52	18.93	16.06	13.19	7.45	3.72
53	18.56	15.76	12.94	7.31	3.65
54	18.23	15.47	12.70	7.17	3.58
55	17.89	15.18	12.47	7.04	3.52
56	17.57	14.91	12.24	6.92	3.46
57	17.26	14.65	12.03	6.80	3.40
58	16.96	14.40	11.82	6.68	3.34
Const's	984.17	835.40	685.93	387.70	193.85

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.09

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	16.68	14.15	11.62	6.57	3.28
60	16.40	13.92	11.43	6.46	3.23
61	16.13	13.69	11.24	6.35	3.17
62	15.87	13.47	11.06	6.25	3.12
63	15.62	13.26	10.88	6.15	3.07
64	15.37	13.05	10.71	6.05	3.02
65	15.14	12.85	10.55	5.96	2.98
66	14.91	12.65	10.39	5.87	2.93
67	14.68	12.46	10.23	5.78	2.89
68	14.47	12.31	10.08	5.70	2.85
69	14.26	12.10	9.94	5.61	2.80
70	14.05	11.93	9.79	5.53	2.76
71	13.86	11.76	9.66	5.46	2.73
72	13.66	11.60	9.52	5.70	2.85
73	13.48	11.44	9.39	5.31	2.65
74	13.27	11.28	9.26	5.23	2.61
75	13.12	11.13	9.14	5.16	2.58
76	12.95	10.99	9.02	5.10	2.55
77	12.81	10.84	8.90	5.03	2.51
78	12.61	10.71	8.79	4.97	2.48
79	12.45	10.57	8.68	4.90	2.45
80	12.30	10.44	8.57	4.84	2.42
81	12.15	10.31	8.46	4.78	2.39
82	12.00	10.18	8.36	4.72	2.36
83	11.85	10.06	8.26	4.67	2.33
84	11.71	9.94	8.16	4.61	2.30
85	11.57	9.82	8.06	4.56	2.28
86	11.44	9.71	7.97	4.50	2.25
87	11.31	9.60	7.88	4.45	2.22
88	11.18	9.49	7.79	4.40	2.20
89	11.05	9.39	7.70	4.35	2.17
90	10.93	9.28	7.62	4.30	2.15
91	10.82	9.18	7.53	4.26	2.13
92	10.69	9.08	7.45	4.21	2.10
93	10.58	8.98	7.37	4.16	2.08
94	10.46	8.88	7.29	4.12	2.06
96	10.25	8.70	7.14	4.03	2.01
98	10.04	8.52	6.99	3.95	1.97
100	9.84	8.35	6.85	3.87	1.93
102	9.64	8.19	6.72	3.80	1.90
104	9.46	8.03	6.59	3.72	1.86
106	9.28	7.88	6.47	3.65	1.82
108	9.11	7.73	6.35	3.58	1.79
110	8.94	7.59	6.23	3.52	1.76
Const's	984.17	835.40	685.93	387.70	193.85



# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 5.22

Whirl  $1\frac{5}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	56.24	47.72	39.19	22.15	11.07
16	52.73	44.73	36.75	20.76	10.38
17	49.62	42.10	34.58	19.55	9.77
18	46.87	39.76	32.66	18.46	9.23
19	44.39	37.67	30.94	17.49	8.74
20	42.17	35.80	29.40	17.62	8.31
21	40.17	34.08	28.00	15.82	7.91
22	38.34	32.53	26.72	15.10	7.55
23	36.68	31.12	25.56	14.45	7.22
24	35.15	29.82	24.50	13.85	6.92
25	33.74	28.63	23.52	13.29	6.64
26	32.45	27.54	22.61	12.78	6.39
27	31.24	26.51	21.77	12.30	6.15
28	30.12	25.56	21.00	11.87	5.93
29	29.09	24.68	20.31	11.46	5.73
30	28.11	23.86	19.60	11.08	5.54
31	27.21	23.09	18.96	10.72	5.36
32	26.35	22.36	18.37	10.38	5.19
33	25.56	21.69	17.82	10.07	5.03
34	24.81	21.05	17.29	9.97	4.98
35	24.10	20.45	16.80	9.49	4.74
36	23.43	19.88	16.33	9.23	4.61
37	22.79	19.34	15.89	8.98	4.49
38	22.18	18.83	15.47	8.74	4.37
39	21.63	18.35	15.08	8.52	4.26
40	21.08	17.90	14.70	8.31	4.15
41	20.57	17.46	14.34	8.10	4.05
42	27.08	17.04	14.00	7.91	3.95
43	19.61	16.64	13.67	7.73	3.86
44	19.17	16.26	13.36	7.55	3.77
45	18.74	15.91	13.06	7.38	3.69
46	18.33	15.56	12.78	7.22	3.61
47	17.94	15.23	12.51	7.07	3.53
48	17.57	14.91	12.25	6.92	3.46
49	17.21	14.61	12.00	6.78	3.39
50	16.87	14.31	11.76	6.64	3.32
51	16.54	14.03	11.53	6.52	3.26
52	16.22	13.77	11.30	6.39	3.18
53	15.91	13.50	11.09	6.25	3.12
54	15.62	13.25	10.88	6.15	3.07
55	15.33	13.01	10.69	6.04	3.02
56	15.06	12.78	10.50	5.98	2.97
57	14.80	12.56	10.31	5.83	2.91
58	14.55	12.34	10.15	5.73	2.86
Const's	843.56	715.75	587.94	332.31	166.15

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 7 inches Diameter  
Whirl  $1\frac{5}{16}$  inch Diameter

Ratio Cylinder to Whirl 1 to 5.22  
Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	14.29	12.13	9.96	5.63	2.81
60	14.05	11.93	9.80	5.54	2.77
61	13.82	11.73	9.64	5.44	2.72
62	13.60	11.54	9.48	5.36	2.68
63	13.39	11.36	9.33	5.27	2.64
64	13.17	11.18	9.18	5.19	2.59
65	12.97	11.01	9.04	5.11	2.55
66	12.78	10.84	8.91	5.03	2.51
67	12.60	10.68	8.77	4.95	2.47
68	12.40	10.52	8.64	4.88	2.44
69	12.22	10.37	8.52	4.82	2.41
70	12.05	10.22	8.40	4.74	2.37
71	11.88	10.08	8.28	4.68	2.34
72	11.71	9.94	8.16	4.61	2.30
73	11.55	9.81	8.05	4.55	2.27
74	11.39	9.67	7.94	4.49	2.24
75	11.25	9.54	7.84	4.43	2.21
76	11.09	9.41	7.73	4.37	2.18
77	10.95	9.29	7.64	4.32	2.16
78	10.81	9.17	7.54	4.26	2.13
79	10.67	9.06	7.44	4.21	2.10
80	10.54	8.95	7.35	4.15	2.07
81	10.41	8.84	7.26	4.10	2.05
82	10.28	8.73	7.17	4.05	2.02
83	10.17	8.62	7.08	4.00	2.00
84	10.04	8.52	7.00	3.95	1.97
85	9.92	8.42	6.92	3.90	1.95
86	9.80	8.32	6.83	3.86	1.93
87	9.69	8.22	6.76	3.82	1.91
88	9.58	8.13	6.68	3.77	1.88
89	9.47	8.04	6.61	3.73	1.86
90	9.37	7.95	6.53	3.69	1.84
91	9.27	7.86	6.46	3.65	1.82
92	9.16	7.78	6.39	3.61	1.80
93	9.07	7.70	6.32	3.57	1.78
94	8.97	7.61	6.25	3.53	1.76
96	8.78	7.45	6.12	3.46	1.73
98	8.60	7.30	6.00	3.39	1.69
100	8.43	7.15	5.88	3.32	1.66
102	8.25	7.01	5.76	3.26	1.63
104	8.11	6.88	5.65	3.19	1.59
106	7.95	6.75	5.54	3.12	1.56
108	7.81	6.62	5.44	3.07	1.53
110	7.66	6.50	5.34	3.02	1.51
Const's	843.56	715.75	587.94	332.31	166.15

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	94.81	80.44	66.08	37.35	18.67
16	88.88	75.41	61.95	35.01	17.51
17	83.65	70.98	58.30	32.95	16.48
18	79.00	67.04	55.06	31.12	15.56
19	74.85	63.51	52.17	29.49	14.74
20	71.10	60.33	49.56	28.01	14.01
21	67.72	57.46	47.20	26.67	13.34
22	64.64	54.85	45.05	25.46	12.73
23	61.83	52.46	43.09	24.36	12.18
24	59.25	50.28	41.30	23.34	11.67
25	56.88	48.26	39.64	22.41	11.20
26	54.69	46.41	38.12	21.55	10.77
27	52.67	44.69	36.71	20.75	10.37
28	50.79	43.09	35.40	20.01	10.00
29	49.04	41.61	34.18	19.32	9.66
30	47.40	40.22	33.04	18.67	9.34
31	45.88	38.92	31.97	18.07	9.04
32	44.44	37.71	30.97	17.51	8.75
33	43.09	36.56	30.04	16.98	8.49
34	41.83	35.49	29.15	16.48	8.24
35	40.63	34.48	28.32	16.01	8.00
36	39.50	33.52	27.53	15.56	7.78
37	38.43	32.61	26.79	15.14	7.57
38	37.42	31.75	26.08	14.74	7.37
39	36.46	30.94	25.41	14.36	7.18
40	35.55	30.17	24.78	14.00	7.00
41	34.69	29.43	24.17	13.66	6.83
42	33.86	28.73	23.59	13.34	6.67
43	33.07	28.06	23.05	13.03	6.51
44	32.32	27.42	22.53	12.73	6.37
45	31.60	26.81	22.03	12.45	6.22
46	30.92	26.23	21.55	12.18	6.09
47	30.26	25.67	21.09	11.92	5.96
48	29.63	25.14	20.65	11.67	5.84
49	29.02	24.63	20.24	11.43	5.72
50	28.44	24.13	19.82	11.20	5.60
51	27.88	23.66	19.43	10.98	5.49
52	27.35	23.20	19.06	10.77	5.39
53	26.83	22.77	18.70	10.57	5.29
54	26.34	22.35	18.35	10.37	5.19
55	25.85	21.94	18.02	10.19	5.09
56	25.39	21.55	17.70	10.00	5.00
57	24.95	21.17	17.39	9.83	4.91
58	24.52	20.80	17.09	9.66	4.83
Const's	1422.10	1206.63	991.16	560.22	280.11

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.80

Whirl  $\frac{7}{8}$  inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	24.10	20.45	16.80	9.50	4.75
60	23.70	20.11	16.52	9.34	4.67
61	23.31	19.78	16.25	9.18	4.59
62	22.94	19.46	15.99	9.04	4.52
63	22.57	19.15	15.73	8.89	4.45
64	22.22	18.86	15.49	8.75	4.38
65	21.88	18.56	15.25	8.62	4.31
66	21.54	18.28	15.02	8.49	4.24
67	21.23	18.01	14.79	8.36	4.18
68	20.91	17.75	14.58	8.24	4.12
69	20.61	17.49	14.36	8.12	4.06
70	20.32	17.24	14.16	8.00	4.00
71	20.03	16.99	13.96	7.89	3.95
72	19.75	16.76	13.77	7.78	3.89
73	19.48	16.53	13.58	7.67	3.84
74	19.21	16.31	13.39	7.57	3.79
75	18.96	16.09	13.22	7.47	3.73
76	18.71	15.88	13.04	7.37	3.69
77	18.47	15.67	12.87	7.28	3.64
78	18.23	15.47	12.71	7.18	3.59
79	18.00	15.27	12.54	7.09	3.55
80	17.77	15.08	12.39	7.00	3.50
81	17.56	14.90	12.23	6.92	3.46
82	17.34	14.72	12.09	6.83	3.42
83	17.13	14.54	11.94	6.75	3.37
84	16.93	14.36	11.80	6.67	3.33
85	16.73	14.20	11.66	6.59	3.30
86	16.53	14.03	11.53	6.51	3.26
87	16.35	13.87	11.39	6.44	3.22
88	16.16	13.71	11.26	6.37	3.18
89	15.98	13.56	11.14	6.29	3.15
90	15.80	13.41	11.01	6.22	3.11
91	15.63	13.26	10.89	6.16	3.08
92	15.46	13.12	10.77	6.09	3.04
93	15.29	12.97	10.66	6.02	3.01
94	15.13	12.84	10.54	5.96	2.98
96	14.81	12.57	10.32	5.84	2.92
98	14.51	12.31	10.11	5.72	2.86
100	14.22	12.07	9.91	5.60	2.80
102	13.94	11.83	9.72	5.49	2.75
104	13.67	11.60	9.53	5.39	2.69
106	13.42	11.38	9.35	5.29	2.64
108	13.17	11.18	9.18	5.19	2.59
110	12.93	10.97	9.01	5.09	2.55
Const's	1422.10	1206.63	991.16	560.22	280.11

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.30

Whirl  $\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	89.42	75.87	62.32	35.23	17.61
16	83.83	71.13	58.42	33.02	16.51
17	78.90	66.95	54.99	31.08	15.54
18	74.51	63.23	51.94	29.35	14.67
19	70.59	59.90	49.20	27.81	13.90
20	67.05	56.90	46.74	26.42	13.21
21	63.87	54.19	44.52	25.16	12.58
22	60.97	51.73	42.49	24.02	12.01
23	58.32	49.48	40.65	22.97	11.49
24	55.88	47.42	38.95	22.02	11.01
25	53.65	45.52	37.39	21.13	10.57
26	51.59	43.77	35.95	20.32	10.16
27	49.68	42.15	34.62	19.57	9.78
28	47.91	40.65	33.39	18.87	9.44
29	46.25	39.24	32.23	18.22	9.11
30	44.71	37.94	31.17	17.61	8.81
31	43.27	36.71	30.16	17.04	8.52
32	41.91	35.56	29.21	16.51	8.26
33	40.65	34.49	28.33	16.01	8.01
34	39.45	33.47	27.50	15.54	7.77
35	38.32	32.51	26.71	15.10	7.55
36	37.26	31.61	25.97	14.68	7.34
37	36.25	30.76	25.27	14.29	7.14
38	35.30	29.95	24.60	13.90	6.95
39	34.39	29.18	23.97	13.55	6.77
40	33.53	28.45	23.37	13.21	6.60
41	32.71	27.76	22.80	12.89	6.44
42	31.93	27.09	22.26	12.58	6.29
43	31.19	26.46	21.74	12.29	6.14
44	30.48	25.87	21.24	12.01	6.00
45	29.81	25.29	20.77	11.74	5.87
46	29.16	24.74	20.32	11.49	5.74
47	28.54	24.21	19.89	11.24	5.62
48	27.94	23.71	19.47	11.01	5.50
49	27.37	23.23	19.08	10.78	5.39
50	26.83	22.76	18.70	10.57	5.28
51	26.30	22.32	18.33	10.36	5.18
52	25.79	21.89	17.98	10.16	5.08
53	25.31	21.47	17.64	9.97	4.98
54	24.84	21.08	17.31	9.78	4.89
55	24.39	20.69	17.00	9.61	4.80
56	23.95	20.32	16.69	9.44	4.71
57	23.53	19.96	16.40	9.27	4.63
58	23.12	19.62	16.12	9.11	4.55
Const's	1341.30	1138.08	934.85	528.39	264.19

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.30

Whirl  $1\frac{5}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	22.73	19.29	15.84	8.96	4.48
60	22.35	18.97	15.58	8.81	4.40
61	21.99	18.65	15.33	8.67	4.33
62	21.63	18.35	15.08	8.52	4.26
63	21.29	18.06	14.84	8.39	4.19
64	20.96	17.78	14.61	8.26	4.13
65	20.64	17.51	14.38	8.13	4.06
66	20.32	17.24	14.16	8.01	4.00
67	20.02	16.98	13.95	7.89	3.94
68	19.72	16.74	13.75	7.77	3.89
69	19.44	16.49	13.55	7.66	3.83
70	19.16	16.26	13.36	7.55	3.77
71	18.89	16.03	13.17	7.44	3.72
72	18.63	15.81	12.98	7.34	3.67
73	18.37	15.59	12.81	7.24	3.62
74	18.13	15.38	12.63	7.14	3.57
75	17.88	15.17	12.46	7.05	3.52
76	17.65	14.97	12.30	6.95	3.48
77	17.42	14.78	12.14	6.86	3.43
78	17.20	14.59	11.99	6.77	3.38
79	16.98	14.40	11.83	6.69	3.34
80	16.77	14.23	11.69	6.60	3.30
81	16.56	14.05	11.54	6.52	3.26
82	16.36	13.88	11.40	6.44	3.22
83	16.16	13.71	11.26	6.37	3.18
84	15.97	13.54	11.13	6.29	3.15
85	15.78	13.39	11.00	6.22	3.11
86	15.60	13.23	10.87	6.14	3.07
87	15.42	13.08	10.75	6.07	3.04
88	15.24	12.93	10.62	6.00	3.00
89	15.07	12.78	10.50	5.94	2.97
90	14.90	12.65	10.39	5.87	2.94
91	14.74	12.51	10.27	5.81	2.90
92	14.58	12.37	10.16	5.74	2.87
93	14.42	12.24	10.05	5.68	2.84
94	14.27	12.10	9.94	5.62	2.81
96	13.97	11.85	9.74	5.50	2.75
98	13.69	11.61	9.54	5.39	2.70
100	13.41	11.38	9.35	5.28	2.64
102	13.15	11.16	9.16	5.18	2.59
104	12.90	10.94	8.99	5.08	2.54
106	12.65	10.74	8.82	4.98	2.49
108	12.42	10.54	8.66	4.89	2.45
110	12.19	10.35	8.50	4.80	2.40
Const's	1341.30	1138.08	934.85	528.39	264.19

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl 1 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	84.03	71.30	58.57	33.10	16.55
16	78.78	66.84	54.91	31.03	15.52
17	74.15	62.91	51.68	29.21	14.60
18	70.03	59.42	48.81	27.58	13.79
19	66.34	56.29	46.24	26.13	13.07
20	63.03	53.47	43.93	24.83	12.41
21	60.02	50.93	41.83	23.64	11.82
22	57.29	48.61	39.93	22.57	11.29
23	54.80	46.50	38.20	21.59	10.79
24	52.52	44.56	36.60	20.69	10.34
25	50.42	42.78	35.14	19.86	9.93
26	48.48	41.13	33.79	19.10	9.55
27	46.68	39.61	32.54	18.39	9.20
28	45.02	38.19	31.38	17.73	8.86
29	43.46	36.88	30.29	17.12	8.56
30	42.02	35.65	29.28	16.55	8.28
31	40.66	34.50	28.34	16.02	8.01
32	39.39	33.42	27.45	15.52	7.76
33	38.20	32.41	26.62	15.05	7.52
34	37.07	31.46	25.84	14.60	7.30
35	36.01	30.56	25.10	14.19	7.09
36	35.01	29.71	24.40	13.79	6.90
37	34.07	28.91	23.74	13.42	6.71
38	33.17	28.14	23.12	13.07	6.53
39	32.32	27.42	22.53	12.73	6.37
40	31.51	26.74	21.96	12.41	6.21
41	30.74	26.09	21.43	12.11	6.06
42	30.01	25.46	20.92	11.82	5.91
43	29.31	24.87	20.43	11.55	5.77
44	28.65	24.31	19.97	11.28	5.64
45	28.01	23.77	19.52	11.03	5.52
46	27.40	23.25	19.10	10.79	5.40
47	26.82	22.76	18.69	10.57	5.28
48	26.26	22.28	18.30	10.35	5.17
49	25.72	21.83	17.93	10.13	5.07
50	25.21	21.39	17.57	9.93	4.97
51	24.72	20.97	17.23	9.74	4.87
52	24.24	20.57	16.89	9.55	4.77
53	23.78	20.18	16.58	9.37	4.68
54	23.34	19.81	16.27	9.20	4.60
55	22.92	19.45	15.97	9.03	4.51
56	22.51	19.10	15.69	8.87	4.43
57	22.11	18.76	15.41	8.71	4.36
58	21.73	18.44	15.15	8.56	4.28
Const's	1260.50	1069.51	878.53	496.56	248.28



# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl 1 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	21.36	18.13	14.89	8.42	4.21
60	21.01	17.82	14.64	8.28	4.14
61	20.66	17.53	14.40	8.14	4.07
62	20.33	17.25	14.17	8.01	4.00
63	20.01	16.98	13.94	7.88	3.94
64	19.70	16.71	13.73	7.76	3.88
65	19.39	16.45	13.51	7.64	3.82
66	19.10	16.21	13.31	7.52	3.76
67	18.81	15.96	13.11	7.41	3.71
68	18.54	15.73	12.92	7.30	3.65
69	18.27	15.50	12.73	7.20	3.60
70	18.01	15.28	12.55	7.09	3.55
71	17.75	15.06	12.37	6.99	3.50
72	17.51	14.85	12.20	6.90	3.45
73	17.27	14.65	12.03	6.80	3.40
74	17.03	14.45	11.87	6.71	3.36
75	16.81	14.26	11.71	6.62	3.31
76	16.59	14.07	11.56	6.53	3.27
77	16.37	13.89	11.41	6.45	3.22
78	16.16	13.71	11.26	6.37	3.18
79	15.96	13.54	11.12	6.29	3.14
80	15.76	13.37	10.98	6.21	3.10
81	15.56	13.20	10.85	6.13	3.07
82	15.37	13.04	10.71	6.06	3.03
83	15.19	12.89	10.58	5.98	2.99
84	15.01	12.73	10.46	5.91	2.96
85	14.83	12.58	10.34	5.84	2.92
86	14.66	12.44	10.22	5.77	2.89
87	14.49	12.29	10.10	5.71	2.85
88	14.32	12.15	9.98	5.64	2.82
89	14.16	12.02	9.87	5.58	2.79
90	14.01	11.88	9.76	5.52	2.76
91	13.85	11.75	9.65	5.46	2.73
92	13.70	11.63	9.55	5.40	2.70
93	13.55	11.50	9.45	5.34	2.67
94	13.41	11.38	9.35	5.28	2.64
96	13.13	11.14	9.15	5.17	2.59
98	12.86	10.91	8.96	5.07	2.53
100	12.60	10.70	8.79	4.97	2.48
102	12.36	10.49	8.61	4.87	2.43
104	12.12	10.28	8.45	4.77	2.39
106	11.89	10.09	8.29	4.68	2.34
108	11.67	9.90	8.13	4.60	2.30
110	11.46	9.72	7.99	4.51	2.25
Const's	1260.50	1069.51	878.53	496.56	248.28

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.30

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
Gears	Twist	Twist	Twist	Twist	Twist
15T	78.65	66.73	54.81	30.98	15.49
16	73.73	62.56	51.39	29.05	14.52
17	69.39	58.88	48.37	27.34	13.67
18	65.54	55.61	45.68	25.82	12.91
19	62.09	52.68	43.27	24.46	12.23
20	58.99	50.05	41.11	23.24	11.62
21	56.17	47.66	39.15	22.13	11.06
22	53.62	45.50	37.37	21.12	10.56
23	51.29	43.52	35.75	20.21	10.10
24	49.15	41.71	34.26	19.36	9.68
25	47.19	40.04	32.89	18.59	9.29
26	45.37	38.50	31.62	17.87	8.94
27	43.69	37.07	30.45	17.21	8.61
28	42.13	35.75	29.36	16.60	8.30
29	40.68	34.52	28.35	16.03	8.01
30	39.32	33.37	27.41	15.49	7.75
31	38.05	32.29	26.52	14.99	7.50
32	36.87	31.28	25.69	14.52	7.26
33	35.75	30.33	24.92	14.08	7.04
34	34.70	29.44	24.18	13.67	6.83
35	33.71	28.60	23.49	13.28	6.64
36	32.77	27.80	22.84	12.91	6.45
37	31.88	27.05	22.22	12.56	6.28
38	31.04	26.34	21.64	12.23	6.11
39	30.25	25.67	21.08	11.92	5.96
40	29.49	25.02	20.56	11.62	5.81
41	28.77	24.41	20.05	11.33	5.67
42	28.09	23.83	19.58	11.07	5.53
43	27.43	23.28	19.12	10.81	5.40
44	26.81	22.75	18.69	10.56	5.28
45	26.22	22.24	18.27	10.33	5.16
46	25.65	21.76	17.87	10.10	5.05
47	25.10	21.30	17.49	9.89	4.94
48	24.58	20.85	17.13	9.68	4.84
49	24.08	20.43	16.78	9.48	4.74
50	23.59	20.02	16.44	9.29	4.65
51	23.13	19.63	16.12	9.11	4.56
52	22.69	19.25	15.81	8.94	4.47
53	22.26	18.89	15.51	8.77	4.38
54	21.85	18.54	15.23	8.61	4.30
55	21.45	18.20	14.95	8.45	4.22
56	21.07	17.87	14.68	8.30	4.15
57	20.70	17.56	14.42	8.15	4.08
58	20.34	17.26	14.18	8.01	4.01
Const's	1179.70	1000.96	822.21	464.73	232.36

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.30

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
Gears	Twist	Twist	Twist	Twist	Twist
59	19.99	16.97	13.94	7.88	3.94
60	19.66	16.68	13.70	7.75	3.87
61	19.34	16.41	13.48	7.62	3.81
62	19.03	16.14	13.26	7.50	3.75
63	18.73	15.89	13.05	7.38	3.69
64	18.43	15.64	12.85	7.26	3.63
65	18.15	15.40	12.65	7.15	3.57
66	17.87	15.17	12.46	7.04	3.52
67	17.61	14.94	12.27	6.94	3.47
68	17.35	14.72	12.09	6.83	3.42
69	17.10	14.51	11.92	6.74	3.37
70	16.85	14.30	11.75	6.64	3.32
71	16.62	14.10	11.58	6.55	3.27
72	16.38	13.90	11.42	6.45	3.23
73	16.16	13.71	11.26	6.37	3.18
74	15.94	13.53	11.11	6.28	3.14
75	15.73	13.35	10.96	6.20	3.10
76	15.52	13.17	10.82	6.11	3.06
77	15.32	13.00	10.68	6.04	3.02
78	15.12	12.83	10.54	5.96	2.98
79	14.93	12.67	10.41	5.88	2.94
80	14.75	12.51	10.28	5.81	2.90
81	14.56	12.36	10.15	5.74	2.87
82	14.39	12.21	10.03	5.67	2.83
83	14.21	12.06	9.91	5.60	2.80
84	14.04	11.92	9.79	5.53	2.77
85	13.88	11.78	9.67	5.47	2.73
86	13.72	11.64	9.56	5.40	2.70
87	13.56	11.51	9.45	5.34	2.67
88	13.41	11.37	9.34	5.28	2.64
89	13.26	11.25	9.24	5.22	2.61
90	13.11	11.12	9.14	5.16	2.58
91	12.96	11.00	9.04	5.11	2.55
92	12.82	10.88	8.94	5.05	2.53
93	12.68	10.76	8.84	5.00	2.50
94	12.55	10.65	8.75	4.94	2.47
96	12.29	10.43	8.56	4.84	2.42
98	12.04	10.21	8.39	4.74	2.37
100	11.80	10.01	8.22	4.65	2.32
102	11.57	9.81	8.06	4.56	2.28
104	11.34	9.62	7.91	4.47	2.23
106	11.13	9.44	7.76	4.38	2.19
108	10.92	9.27	7.61	4.30	2.15
110	10.72	9.10	7.47	4.22	2.11
Const's	1179.70	1000.96	822.21	464.73	232.36

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.00

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	75.41	63.99	52.56	29.71	14.85
16	70.70	59.99	49.28	27.85	13.93
17	66.54	56.46	46.38	26.21	13.11
18	62.85	53.32	43.80	24.76	12.38
19	59.54	50.52	41.50	23.45	11.73
20	56.56	47.99	39.42	22.28	11.14
21	53.87	45.71	37.54	21.22	10.61
22	51.42	43.63	35.84	20.26	10.13
23	49.18	41.73	34.28	19.38	9.69
24	47.13	39.99	32.85	18.57	9.28
25	45.25	38.39	31.54	17.82	8.91
26	43.51	36.92	30.32	17.14	8.57
27	41.90	35.55	29.20	16.50	8.25
28	40.40	34.28	28.16	15.92	7.96
29	39.01	33.10	27.19	15.37	7.68
30	37.71	31.99	26.28	14.85	7.43
31	36.49	30.96	25.43	14.38	7.19
32	35.35	29.99	24.64	13.93	6.96
33	34.28	29.09	23.89	13.50	6.75
34	33.27	28.23	23.19	13.11	6.55
35	32.32	27.42	22.53	12.73	6.37
36	31.42	26.66	21.90	12.38	6.19
37	30.57	25.94	21.31	12.04	6.02
38	29.77	25.26	20.75	11.73	5.86
39	29.01	24.61	20.22	11.43	5.71
40	28.38	24.00	19.71	11.14	5.57
41	27.59	23.41	19.23	10.87	5.43
42	26.93	22.85	18.77	10.61	5.31
43	26.31	22.32	18.33	10.36	5.18
44	25.71	21.81	17.92	10.12	5.06
45	25.14	21.33	17.52	9.90	4.95
46	24.59	20.87	17.14	9.69	4.84
47	24.07	20.42	16.77	9.48	4.74
48	23.57	20.00	16.43	9.28	4.64
49	23.09	19.59	16.09	9.09	4.55
50	22.62	19.20	15.77	8.91	4.46
51	22.18	18.82	15.46	8.74	4.37
52	21.75	18.46	15.16	8.57	4.28
53	21.34	18.11	14.88	8.41	4.20
54	20.95	17.77	14.60	8.25	4.13
55	20.57	17.45	14.33	8.10	4.05
56	20.20	17.14	14.08	7.96	3.98
57	19.85	16.84	13.83	7.82	3.91
58	19.50	16.55	13.59	7.68	3.84
Const's	1131.22	959.82	788.42	445.63	222.81

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.00

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	19.17	16.27	13.36	7.55	3.78
60	18.85	16.00	13.14	7.43	3.71
61	18.54	15.73	12.92	7.31	3.65
62	18.25	15.48	12.72	7.19	3.59
63	17.95	15.24	12.52	7.07	3.54
64	17.68	15.00	12.32	6.96	3.48
65	17.40	14.77	12.13	6.86	3.43
66	17.14	14.54	11.95	6.75	3.38
67	16.88	14.33	11.77	6.65	3.33
68	16.64	14.12	11.59	6.55	3.28
69	16.39	13.91	11.43	6.46	3.23
70	16.16	13.71	11.26	6.37	3.18
71	15.93	13.52	11.10	6.28	3.14
72	15.71	13.33	10.95	6.19	3.09
73	15.50	13.15	10.80	6.10	3.05
74	15.29	12.97	10.65	6.02	3.01
75	15.08	12.80	10.51	5.94	2.97
76	14.88	12.63	10.38	5.86	2.93
77	14.69	12.47	10.24	5.79	2.89
78	14.50	12.31	10.11	5.71	2.86
79	14.32	12.15	9.98	5.64	2.82
80	14.14	12.00	9.86	5.57	2.79
81	13.97	11.85	9.73	5.50	2.75
82	13.80	11.71	9.61	5.43	2.72
83	13.63	11.56	9.50	5.37	2.68
84	13.46	11.43	9.39	5.30	2.65
85	13.31	11.29	9.28	5.24	2.62
86	13.15	11.16	9.17	5.18	2.59
87	13.00	11.03	9.06	5.12	2.56
88	12.85	10.91	8.96	5.06	2.53
89	12.71	10.78	8.86	5.01	2.50
90	12.57	10.66	8.76	4.95	2.48
91	12.43	10.55	8.66	4.90	2.45
92	12.30	10.43	8.57	4.84	2.42
93	12.16	10.32	8.48	4.79	2.40
94	12.03	10.21	8.39	4.74	2.37
96	11.78	10.00	8.21	4.64	2.32
98	11.54	9.79	8.05	4.55	2.27
100	11.31	9.60	7.88	4.46	2.23
102	11.09	9.41	7.73	4.37	2.18
104	10.88	9.23	7.58	4.28	2.14
106	10.67	9.05	7.44	4.20	2.10
108	10.48	8.89	7.30	4.13	2.06
110	10.28	8.73	7.17	4.05	2.03
Const's	1131.22	959.82	788.42	445.63	222.81

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter  
Whirl  $1\frac{5}{16}$  inch Diameter

Ratio Cylinder to Whirl 1 to 5.90  
Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
15T	63.56	53.93	44.30	25.04	12.52
16	59.59	50.56	41.53	23.47	11.74
17	56.09	47.59	39.09	22.09	11.05
18	52.97	44.94	36.92	20.87	10.43
19	50.18	42.58	34.98	19.77	9.88
20	47.67	40.45	33.23	18.78	9.39
21	45.40	38.52	31.64	17.89	8.94
22	43.34	36.77	30.21	17.07	8.54
23	41.45	35.17	28.89	16.33	8.17
24	39.73	33.71	27.69	15.65	7.82
25	38.14	32.36	26.58	15.02	7.51
26	36.67	31.11	25.56	14.45	7.22
27	35.31	29.96	24.61	13.91	6.96
28	34.05	28.89	23.73	13.41	6.71
29	32.88	27.89	22.91	12.95	6.48
30	31.78	26.97	22.15	12.52	6.26
31	29.76	26.10	21.44	12.12	6.06
32	29.80	25.28	20.77	11.74	5.87
33	28.89	24.51	20.14	11.38	5.69
34	28.04	23.79	19.54	11.05	5.52
35	27.24	23.11	18.99	10.73	5.37
36	26.49	22.47	18.46	10.43	5.22
37	25.77	21.86	17.96	10.15	5.08
38	25.09	21.29	17.48	9.88	4.94
39	24.45	20.74	17.04	9.63	4.82
40	23.84	20.22	16.61	9.39	4.69
41	23.26	19.73	16.21	9.16	4.58
42	22.70	19.26	15.82	8.94	4.47
43	22.17	18.81	15.45	8.73	4.37
44	21.67	18.39	15.10	8.54	4.27
45	21.19	17.98	14.77	8.35	4.17
46	20.73	17.59	14.45	8.16	4.08
47	20.29	17.21	14.14	7.99	4.00
48	19.86	16.85	13.84	7.82	3.91
49	19.46	16.51	13.56	7.67	3.83
50	19.08	16.18	13.29	7.51	3.76
51	18.69	15.86	13.03	7.36	3.68
52	18.34	15.56	12.78	7.22	3.61
53	17.99	15.26	12.54	7.09	3.54
54	17.66	14.98	12.31	6.96	3.48
55	17.34	14.71	12.08	6.83	3.41
56	17.03	14.45	11.87	6.71	3.35
57	16.73	14.19	11.66	6.59	3.29
58	16.44	13.95	11.46	6.48	3.24
Const's	953.46	808.99	664.53	375.60	187.80

# TAPE DRIVE

## SPINNING TWIST GEAR TABLE

### Front Roll 1 inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 5.90

Whirl  $1\frac{5}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92	Cyl. 69 Stud 69
	Twist	Twist	Twist	Twist	Twist
59	16.16	13.71	11.26	6.37	3.18
60	15.89	13.48	11.08	6.26	3.13
61	15.63	13.26	10.89	6.16	3.08
62	15.38	13.05	10.72	6.06	3.03
63	15.13	12.84	10.55	5.96	2.98
64	14.90	12.64	10.38	5.87	2.93
65	14.67	12.45	10.22	5.78	2.89
66	14.45	12.26	10.07	5.69	2.85
67	14.23	12.07	9.92	5.61	2.80
68	14.02	11.89	9.77	5.52	2.76
69	13.82	11.72	9.63	5.44	2.72
70	13.62	11.56	9.49	5.37	2.68
71	13.43	11.39	9.36	5.29	2.65
72	13.24	11.24	9.23	5.22	2.61
73	13.06	11.08	9.10	5.15	2.57
74	12.88	10.93	8.98	5.08	2.54
75	12.71	10.79	8.86	5.01	2.50
76	12.54	10.64	8.74	4.94	2.47
77	12.38	10.51	8.63	4.88	2.44
78	12.22	10.37	8.52	4.82	2.41
79	12.07	10.24	8.41	4.75	2.38
80	11.92	10.11	8.31	4.69	2.35
81	11.77	9.99	8.20	4.64	2.32
82	11.63	9.87	8.10	4.58	2.29
83	11.49	9.74	8.01	4.53	2.26
84	11.35	9.63	7.91	4.47	2.24
85	11.21	9.52	7.82	4.42	2.21
86	11.09	9.41	7.73	4.37	2.18
87	10.96	9.30	7.64	4.32	2.16
88	10.83	9.19	7.55	4.27	2.13
89	10.71	9.09	7.47	4.22	2.11
90	10.59	8.99	7.38	4.17	2.09
91	10.48	8.89	7.30	4.13	2.06
92	10.36	8.79	7.22	4.08	2.04
93	10.25	8.70	7.15	4.04	2.02
94	10.14	8.60	7.07	4.00	2.00
96	9.93	8.43	6.92	3.91	1.96
98	9.73	8.25	6.78	3.83	1.92
100	9.53	8.09	6.64	3.76	1.88
102	9.35	7.93	6.51	3.68	1.84
104	9.17	7.78	6.39	3.61	1.81
106	8.99	7.63	6.27	3.54	1.77
108	8.83	7.49	6.15	3.48	1.74
110	8.67	7.35	6.04	3.41	1.71
Const's	953.46	808.99	664.53	373.60	187.80



## PRODUCTION TABLES

**The production** of a ring spinning frame depends on several varying factors, viz: the character of the product required, the length and grade of staple, the amount of twist imparted to the yarn and the working conditions of the frame.

The figures tabulated in the following pages are based on data obtained from several conservatively operated mills and consequently may be used as a basis for estimating productions of frames working under like conditions.

The twists per inch are based on the following twist multipliers:

## WARP YARNS

4.75 x	sq. root of number of yarn from 4's	to 35's inclusive
4.60 x	" " " "	36's " 40's "
4.50 x	" " " "	41's " 75's "
4.25 x	" " " "	76's " 100's "

## FILLING YARNS

3.50	x	sq.	root of number of yarn from	4's to 27's inclusive
3.40	x	" "	" " " "	27's " 34's "
3.25	x	" "	" " " "	34's " 60's "
3.20	x	" "	" " " "	60's " 100's "

## HOSIERY YARNS

3.00 x sq. root of number of yarn from	2's to 25's inclusive	
2.75 x " " " " " "	26's " 36's	"
2.50 x " " " " " "	37's " 50's	"

# PRODUCTION TABLE OF RING WARP YARN

Frames Without Separators

1 inch Diameter Front Roll

No. of Yarn	Size of Spindle	Gauge of Frame	Dia. of Ring	Length of Traverse	Twist Per Inch	Rev. of Front Roll Per Minute	Rev. of Spindles per Minute	Hanks per Spindle per 10 Hours	Pounds per Spindle per Week-60 hours	Pounds per Spindle per Week of 54 hours	Pounds per Spindle per Week of 48 Hours	Length of Staple	Allowance for Stoppage
4	Large Gravity				9.5	171	5100	9.38	14.07	12.66	11.26		
6				8"	10.6	166	5525	9.11	10.93	9.84	8.74		
6		4 1/2"	2 1/4"		11.6	164	6000	9.00	9.00	8.10	7.20		
7					12.6	165	6550	9.05	7.76	6.98	6.21		
8					13.4	166	7000	9.11	6.83	6.15	5.46		
9		4"			14.3	162	7300	8.89	5.93	5.34	4.74	1'	12%
10	MEDIUM No. 1		2 1/8"	7 3/4"	15.0	159	7500	8.92	5.35	4.82	4.28	3/8" to 1'	
11					15.7	156	7700	8.75	4.77	4.29	3.82		
12					16.4	152	7850	8.53	4.26	3.84	3.41		
13					17.1	149	8000	8.36	3.86	3.47	3.08		
14		3 3/4"	2"	7 1/2"	17.8	147	8250	8.25	3.54	3.18	2.83		
15					18.4	143	8300	8.03	3.21	2.89	2.57		10%
16					19.0	142	8500	7.97	2.99	2.69	2.39		
17					19.6	139	8600	7.80	2.75	2.48	2.20		
18					20.1	138	8700	7.75	2.58	2.32	2.06		
19					20.7	135	8800	7.58	2.34	2.15	1.91		
20				7"	21.2	134	8950	7.50	2.25	2.02	1.80		
21		3 1/2"			21.7	132	9000	7.49	2.14	1.93	1.71		
22					22.2	129	9050	7.32	1.99	1.79	1.59		
23			1 3/8"		22.7	127	9100	7.21	1.88	1.69	1.50		
24					23.2	126	9200	7.15	1.79	1.61	1.43		
25					23.7	124	9250	7.03	1.69	1.52	1.35	1' to 1 1/4"	9%
26					24.2	122	9300	6.92	1.60	1.44	1.28		
27					24.7	120	9325	6.80	1.51	1.36	1.21		
28					25.1	119	9425	6.75	1.44	1.30	1.16	1' to 1 1/4"	
29					25.6	117	9450	6.64	1.37	1.24	1.10		
30					26.0	116	9525	6.65	1.33	1.20	1.06		
31					26.4	115	9600	6.59	1.27	1.15	1.02		
32				6 1/2"	26.9	113	9600	6.48	1.21	1.09	.97		
33			1 3/4"		27.3	112	9600	6.42	1.17	1.05	.93		
34					27.4	111	9600	6.36	1.12	1.01	.90		
35		3 1/4"			27.5	111	9600	6.36	1.09	.98	.87		8%
36					27.6	110	9600	6.31	1.05	.95	.84		
37					27.8	110	9600	6.31	1.02	.92	.82		
38					28.0	109	9600	6.25	.99	.89	.79		
39					28.4	108	9700	6.19	.95	.86	.76		
40			1 5/8"		28.5	108	9700	6.26	.94	.84	.75		
41					28.8	107	9700	6.20	.91	.82	.73		
42					29.2	105	9700	6.09	.87	.78	.70		
43					29.5	104	9725	6.03	.84	.76	.67		
44					29.7	104	9700	6.03	.82	.74	.66		
45					30.2	102	9750	5.91	.79	.71	.63	1 1/4" to 1 1/2"	
46					30.5	102	9775	5.91	.77	.69	.62		7%
47					30.9	100	9700	5.80	.74	.67	.59		
48		3"	1 1/2"	6"	31.2	99	9700	5.74	.72	.64	.57		
49					31.5	98	9700	5.68	.70	.63	.56		
50					31.8	97	9700	5.69	.68	.61	.55		
55					33.4	92	9750	5.39	.59	.53	.47		6%
60					34.8	89	9775	5.21	.52	.46	.41		
65					36.3	84	9625	4.98	.46	.41	.37		
70					37.7	80	9525	4.74	.41	.37	.32		
75				5" to 5 1/2"	39.0	76	9300	4.49	.36	.32	.29		5%
80		2 3/4"	1 3/8"		39.1	74	9200	4.39	.33	.30	.26	1 1/4" to 1 1/2"	
85					39.2	74	9200	4.48	.32	.28	.25		
90					40.3	72	9100	4.35	.29	.26	.23		3%
95					41.2	69	9000	4.17	.26	.24	.21		
100					42.5	65	8800	3.93	.24	.21	.19		

# PRODUCTION TABLE OF RING FILLING YARN

## Frames Without Separators

## 1 inch Diameter Front Roll

No. of Yarn	Size of Spindle	Gauge of Frame	Dia. of Ring	Length of Traverse	Twist Per Inch	Rev. of Front Roll Per Minute	Rev. of Spindles per Minute	Hanks per Spindle per 10 Hours	Pounds per Spindle per Week of 60 hours	Pounds per Spindle per Week of 54 hours	Pounds per Spindle per Week of 48 hours	Staple	Allowance for Stoppage
4	Large Gravity				7.0	214	4700	10.68	16.03	14.42	12.82		
5					7.8	196	4800	9.77	11.72	10.55	9.38		
6		3¼"	1½"	8"	8.6	192	5200	9.57	9.57	8.61	7.65		
7					9.3	188	5500	9.37	8.04	7.24	6.43		20%
8	MEDIUM No. 1				9.9	186	5800	9.27	6.95	6.25	5.56	1"	
9					10.5	182	6000	9.08	6.05	5.45	4.84	to	
10					11.1	178	6200	9.09	5.45	4.90	4.36		
11					11.6	174	6350	8.88	4.84	4.36	3.87	¾"	
12			1½"		12.1	172	6550	8.78	4.39	3.95	3.51		18%
13					12.6	172	6800	8.78	4.05	3.65	3.24		
14			to		13.1	168	6900	8.58	3.68	3.31	2.94		
15				7"	13.6	165	7050	8.73	3.49	3.14	2.78		
16		3"	1½"		14.0	162	7150	8.57	3.22	2.90	2.58		
17					14.4	161	7300	8.51	3.00	2.70	2.40		15%
18	STANDARD No. 1				14.9	158	7400	8.36	2.79	2.51	2.23		
19					15.3	156	7500	8.25	2.60	2.34	2.08		
20					15.7	154	7600	8.45	2.53	2.28	2.02		
21					16.0	154	7750	8.45	2.41	2.17	1.93		
22					16.4	154	7925	8.45	2.30	2.07	1.84		12%
23					16.8	152	8025	8.34	2.16	1.94	1.72		
24					17.2	150	8100	8.23	2.06	1.85	1.64	1½"	
25					17.5	149	8200	8.35	2.00	1.80	1.60	to	
26					17.9	148	8300	8.30	1.91	1.71	1.52		10%
27					17.7	148	8225	8.30	1.84	1.65	1.47	1"	
28					18.0	146	8250	8.22	1.72	1.55	1.37		
29					18.3	144	8275	8.07	1.67	1.50	1.33		
30			1¾"		18.4	142	8200	8.05	1.61	1.44	1.28		
31					18.6	141	8225	7.99	1.54	1.38	1.23		
32					18.7	140	8225	7.93	1.48	1.33	1.18		9%
33					18.9	138	8200	7.82	1.41	1.26	1.12		
34					19.0	136	8125	7.71	1.36	1.22	1.08		
35					19.2	134	8175	7.69	1.32	1.18	1.05		
36					19.5	132	8175	7.57	1.26	1.13	1.00		
37		2¾"			19.8	130	8100	7.46	1.21	1.08	.96		
38					20.0	128	8075	7.34	1.16	1.04	.92		8%
39				6½"	20.3	126	8050	7.23	1.11	.99	.88		
40					20.6	124	8025	7.19	1.08	.97	.86		
41					20.8	122	7975	7.07	1.03	.92	.82	1¼"	
42					21.1	120	7950	6.96	.99	.89	.79	to	
43					21.3	118	7900	6.84	.95	.85	.76		
44					21.5	117	7900	6.78	.93	.83	.74	1½"	
45					21.8	115	7875	6.67	.89	.80	.71		
46					22.0	114	7875	6.61	.86	.77	.68		7%
47					22.2	113	7875	6.55	.83	.74	.66		
48					22.5	112	7875	6.49	.81	.72	.64		
49					22.7	111	7850	6.43	.78	.70	.62		
50					23.0	109	7850	6.38	.76	.68	.60		6%
55			1¼"		24.1	103	7800	6.03	.65	.58	.52		
60					25.1	99	7825	5.86	.58	.52	.46		
65					25.8	97	7850	5.74	.53	.47	.42		
70					26.7	93	7825	5.50	.47	.42	.37	2"	5%
75					27.7	90	7825	5.32	.42	.37	.33		
80				6"	28.6	87	7825	5.22	.39	.35	.31	to	
85					29.8	84	7800	5.04	.35	.31	.28		3%
90					30.4	81	7725	4.86	.32	.29	.25	1½"	
95					31.2	78	7675	4.75	.30	.27	.24		2%
100					32.0	76	7650	4.63	.27	.24	.21		

# PRODUCTION TABLE OF RING HOSIERY YARNS

## Frames Without Separators

## 1 inch Diameter Front Roll

No. of Yarn	Size of Spindle	Gauge of Frame	Dia. of Ring	Length of Traverse	Twist Per Inch	Rev. of Front Roll Per Minute	Rev. of Spindles per Minute	Hanks per Spindle per 10 Hours	Pounds per Spindle per Week of 60 hours	Pounds per Spindle per Week of 54 hours	Pounds per Spindle per Week of 48 Hours	Staple	Allowance for Stoppage
2	Large Gravity				4.2	220	2900	10.98	32.94	29.65	26.35		
3					5.2	214	3500	10.68	21.36	19.22	17.08		
4					6.0	208	3925	10.38	15.57	14.01	12.45		
5		3¾"	2¼"	8"	6.7	202	4250	10.08	12.10	10.89	9.68		
6					7.4	196	4550	9.78	9.78	8.80	7.82		
7					7.9	190	4700	9.49	8.14	7.32	6.51		20%
8					8.5	185	4950	9.23	6.92	6.23	5.54		
9	MEDIUM No. 1				9.0	181	5125	9.04	6.03	5.43	4.82	7/8"	
10					9.5	177	5275	9.05	5.43	4.89	4.34	to	
11					9.9	173	5375	8.85	4.82	4.34	3.85	1"	
12					10.4	170	5550	8.70	4.35	3.91	3.48		18%
13					10.8	168	5700	8.60	3.97	3.57	3.18		
14			2"		11.2	166	5850	8.50	3.64	3.27	2.91		
15					11.6	164	5925	8.69	3.48	3.13	2.78		
16				7"	12.0	162	6100	8.59	3.24	2.92	2.59		
17		3½"			12.4	160	6225	8.48	2.99	2.69	2.39		15%
18					12.7	158	6300	8.37	2.79	2.51	2.23		
19					13.1	156	6425	8.26	2.61	2.35	2.09		
20					13.4	154	6500	8.45	2.53	2.28	2.05		
21	STANDARD No. 1				13.7	153	6600	8.40	2.40	2.16	1.92		
22					14.1	152	6725	8.34	2.27	2.04	1.82		12%
23			1⅞"		14.4	150	6800	8.23	2.15	1.93	1.72		
24					14.7	148	6825	8.12	2.06	1.85	1.65		
25					15.0	146	6875	8.20	1.97	1.77	1.58		
26					14.0	145	6375	8.14	1.88	1.69	1.50	1"	
27					14.3	144	6475	8.09	1.80	1.62	1.44	to	10%
28					14.5	143	6500	8.03	1.72	1.55	1.38	1¼"	
29					14.8	142	6600	7.97	1.65	1.48	1.32		
30					15.1	140	6650	7.95	1.59	1.43	1.27		
31					15.3	138	6625	7.84	1.52	1.37	1.22		
32					15.6	136	6675	7.72	1.45	1.30	1.16		9%
33	STANDARD No. 1			6½"	15.8	134	6650	7.61	1.38	1.24	1.10		
34		3¼"	1¾"		16.0	132	6625	7.49	1.32	1.19	1.06		
35					16.3	130	6650	7.46	1.28	1.15	1.02		
36					16.5	128	6625	7.35	1.22	1.10	.98		
37					15.2	127	6075	7.29	1.17	1.05	.94		8%
38					15.4	126	6100	7.23	1.14	1.03	.91		
39					15.6	125	6125	7.18	1.10	.99	.88		
40					15.8	124	6150	7.19	1.08	.97	.86		
41					16.0	123	6175	7.13	1.04	.94	.83		
42					16.2	122	6200	7.08	1.01	.91	.81	1⅞"	
43					16.4	121	6225	7.02	.98	.88	.78	to	
44	STANDARD No. 1				16.6	120	6250	6.96	.95	.85	.76	1½"	
45		3"	1½"		16.8	119	6275	6.90	.92	.83	.74		7%
46					17.0	118	6300	6.84	.89	.80	.71		
47					17.1	117	6300	6.79	.87	.78	.70		
48					17.3	116	6300	6.73	.84	.76	.67		
49					17.5	115	6325	6.67	.82	.74	.66		
50					17.7	114	6350	6.61	.79	.71	.63		

# DRAPER'S TABLE

## Of Breaking Weight in Pounds per Skein of AMERICAN WARP YARN

120 Yds. Weight Grains	Number of Yarn	Carded Yarn Breaking Weight	Combed Yarn Breaking Weight	120 Yds. Weight Grains	Number of Yarn	Carded Yarn Breaking Weight	Combed Yarn Breaking Weight
1000	1			20	51	37	47
500	2			19	52	36	46
333	3	530	863	19	53	36	45
250	4	410	646	19	54	35	44
200	5	330	516	18	55	34	43
167	6	275	429	18	56	34	42
143	7	238	367	18	57	33	42
125	8	209	321	17	58	33	41
111	9	187	285	17	59	32	40
100	10	169	256	17	60	32	39
91	11	154	232	16	61	31	39
83	12	142	213	16	62	31	38
77	13	132	196	16	63	30	37
71	14	123	182	16	64	30	37
67	15	115	169	15	65	30	36
63	16	108	158	15	66	29	35
59	17	103	149	15	67	29	35
56	18	97	140	15	68	29	34
53	19	93	133	15	69	28	34
50	20	88	126	14	70	28	33
48	21	84	120	14	71	27	33
46	22	80	114	14	72	27	32
44	23	76	109	14	73	27	32
42	24	72	104	14	74	27	31
40	25	69	100	13	75	26	31
39	26	66	96	13	76	26	30
37	27	64	92	13	77	26	30
36	28	61	89	13	78	25	29
35	29	59	86	13	79	25	29
33	30	57	83	13	80	25	28
32	31	56	80	12	81	24	28
31	32	54	77	12	82	24	28
30	33	53	75	12	83	24	27
29	34	51	72	12	84	23	27
29	35	50	70	12	85	23	27
28	36	49	68	12	86	23	26
27	37	48	66	12	87	23	26
26	38	47	64	11	88	22	26
26	39	46	63	11	89	22	25
25	40	45	61	11	90	22	25
24	41	44	59	11	91	22	25
24	42	43	58	11	92	22	24
23	43	42	56	11	93	21	24
23	44	41	55	11	94	21	24
22	45	41	54	11	95	21	23
22	46	40	53	10	96	21	23
21	47	39	51	10	97	21	23
21	48	39	50	10	98	20	23
20	49	38	49	10	99	20	22
20	50	37	48	10	100	20	22

## CARE OF SPINNING FRAMES

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The **proper care of machinery** in the spinning department of a cotton mill is an important consideration, and the smallest details should not be overlooked, if good quality and maximum production is desired. Systematic care in keeping the frames clean and in proper working order will repay the spinner, as good results cannot be had if the frames are neglected and allowed to get out of repair. Periodical attention should be given to the oiling and cleaning of the rolls, both top and bottom, the spindles, lifting rods and all bearings. The frames when first installed should be accurately levelled, and this condition should be maintained by frequent inspections and releveled whenever found necessary.

### SPINDLES

New frames should have their spindles banded and run empty for 12 to 24 hours before they are set to the rings. New spindles should be oiled every other day for the first week. Then twice each week for two or three weeks. After which every two weeks will be sufficient.

In setting spindles to rings it is customary to use a bobbin with a wood plug attached which should be evenly balanced to avoid vibration. This plug should be about 1-16 inch smaller than the inside of ring. Some spindle setters place the ring rail at the middle of the bobbin when setting spindles so that any variation between top and bottom will be divided.

A more accurate method is to set the spindles to the rings at the bottom of the bobbin. Then run the rail to the top of the bobbin. Any spindle not found in the center of the ring will now need papering. A good smooth paper should be used, as a coarse surfaced paper will absorb oil and soon become soft, allowing spindle base to lean and spindle become out of center. By running the rail up and down three or four times, and repapering, spindles can be made to run in the center of the ring from bottom to top. Guide wires should be set so that the point of the set will touch the back of the opening on the inside. If guides are worn or grooved they should be replaced or made perfectly smooth on the inside. This is a point that is often overlooked in overhauling. Vibrating spindles should be examined very closely. As there are several things that will cause this fault, such as bad bobbin, crooked spindle blade or a worn or dry bolster.

## CLEANING

For medium and fine work the deck boards and creels should be dusted at least once a day; the accumulation of lint and dust about the skewer steps and top holes should be removed every other day; the thread boards blocked off every hour, and also thoroughly wiped with waste twice a day. The separators and ring rails should be brushed off every other day; the bolster rails wiped with waste twice daily. The bottom rolls should be wiped with waste twice a week. The front top-rolls should be cleaned daily while the frame is running, if desired, by wiping the leather covers with waste dipped in a half and half mixture of alcohol and water. The back and middle rolls should be treated in the same manner, but only once a week. The top-clearers should be picked four times daily, and scavenger rolls as often as necessary. The spindles should be taken from the frame twice a year, the dirty oil removed and all parts of the spindle thoroughly cleaned before refitting in frame. All remaining parts of frame should have daily brushings, excepting the back weights where one brushing a week would be sufficient.

## OILING.

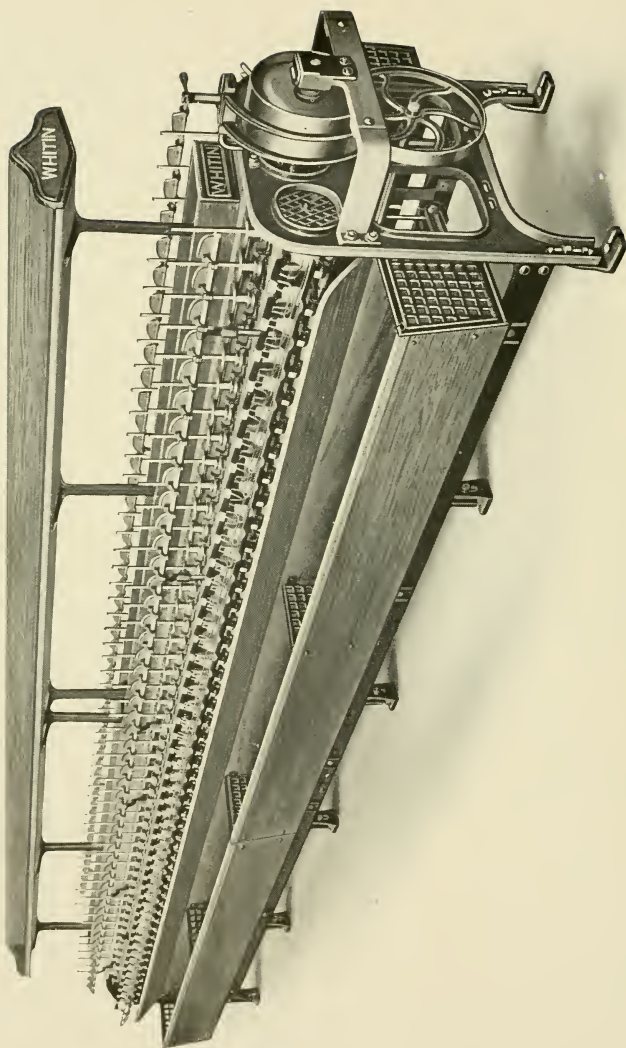
The loose pulley, cylinder bearings, head end gearing and top front rolls should be oiled daily; the steel roll bearings twice a day; for the back and middle top-roll end bearings and builder motion weekly oiling will be sufficient; saddle bearings twice a week. The spindles should be oiled every two weeks, although it would not be amiss to put in a little fresh oil every week.

## BOBBINS.

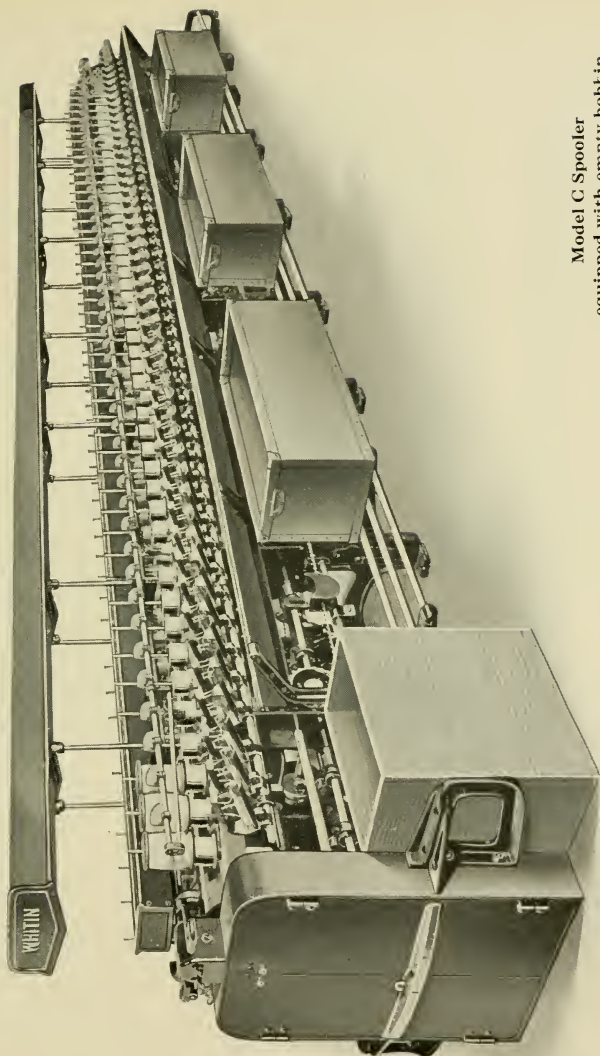
Badly fitted bobbins and poor oil are the causes of considerable trouble, therefore the greatest care should be exercised in the selection of both, otherwise good and satisfactory results cannot be obtained.



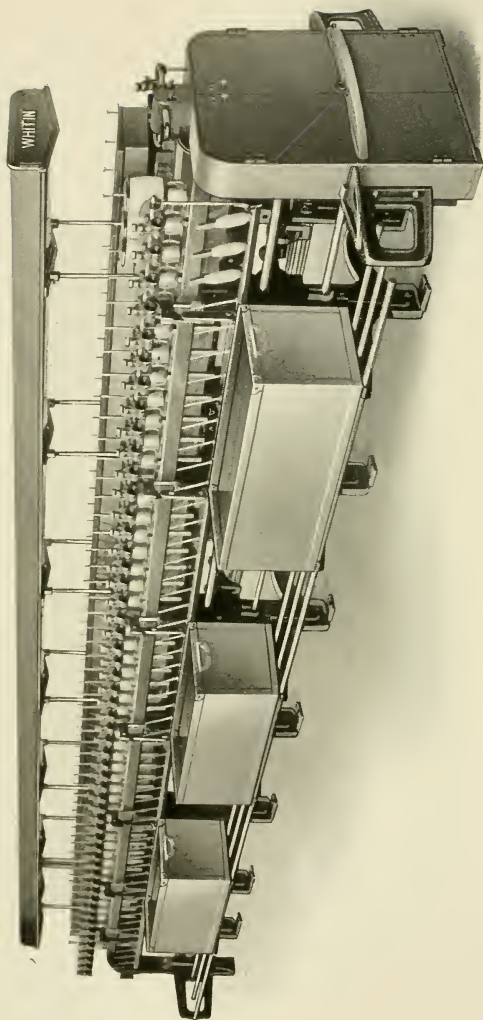
# SPOOLING



Model B Spooler



Model C Spooler  
equipped with empty bobbin  
carrier



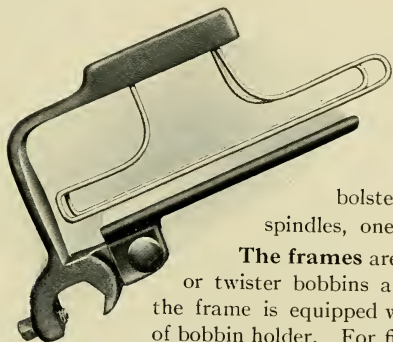
Model C Spooler  
with side-box shelves and supply bobbin carrier

## WHITIN SPOOLERS

We make two types of spoolers, viz: **Model B** and **Model C**, differing from each other in general design and drive of spindles.

### MODEL B

**This machine** has long been favorably known to the trade, the general appearance of which is clearly shown in the illustration on page 126. The frame is of a substantial design, the ends being connected by four rigid iron girts, supported at frequent intervals by heavy sampsons. The ends and sampsons are fitted with adjustable feet to suit uneven flooring. The top girts holding the spindle bolsters furnish a firm foundation with a minimum amount of vibration for the spindles running at any economical speed.



Wade Bobbin  
Holder

**The spindles** of the band driving type are as light as is consistent with the work demanded of them. They do not require oiling more than once a month, due to the large oil supply in the bolster case. One band drives two spindles, one on each side of the frame.

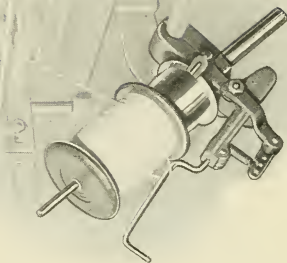
**The frames** are built to wind from warp, filling or twister bobbins as ordered. For warp bobbins the frame is equipped with the well-known Wade type of bobbin holder. For filling bobbins or cops the frame is fitted with skewers held on rods on each side of the frame. Side spindles are provided for winding from twister bobbins.

**The thread guides** are easily and positively set to suit the size of yarn by means of inclined adjusting feet with positive holding screws.

In order to obtain satisfactorily wound spools from **filling wound bobbins** it is essential that a uniform tension be imparted to the yarn in its passage from the bobbin to the spool, accordingly we have devised a number of different devices for this purpose which are illustrated on page 130.

**No. 1** is our Patented ball tension wherein more tension may be obtained by additional balls held in the magazine.

# WHITIN THREAD TENSIONS



No. 1

No. 2

No. 3

No. 4

**No. 2** makes use of a steel ball supported in a porcelain cup, the tension depends on the weight of the ball.

**No. 3** comprises two discs pressed together by a spring mounted on a stud, tension being varied by tightening or loosening the spring.

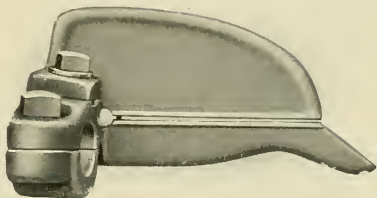
**No. 4** is particularly adapted for rewinding heavy yarns.

The grid type of tension shown on page 132 meets the approval of many manufacturers.

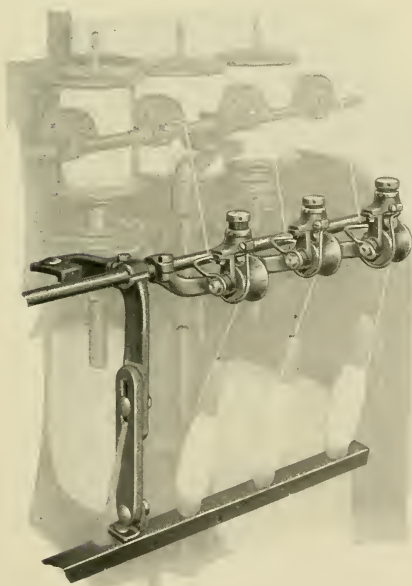
Old spoolers of any make may be satisfactorily arranged to spool from filling wound bobbins by the application of the construction as illustrated.

By this arrangement the weight of the supply bobbins and thread tensions is supported by the framing of the machine.

**The traverse motion** is actuated by a mangle wheel driving motion. On long frames two mangle wheels are used, thus ensuring a uniform and positive motion to the thread guides the entire length of the frame thereby guaranteeing perfectly wound spools. The lifting rod levers are pivoted to holders fixed to the traverse shaft, thus preventing any possibility of breakage to the mangle



**Prest Guide**



**Tension Attachment for Old Machines**



wheel or gearing due to any obstruction being caught under the lever, or lifting rods. The bobbin boxes may be of wood with iron ends and partitions as shown in the illustration or if preferred our "all metal" type of box can be substituted.

The driving pulleys vary in size from 8" to 14" diameter by  $2\frac{1}{2}$ " face and run one revolution to 3.26 revolutions of spindle with  $1\frac{3}{4}$ " diameter whirl. The driving shaft runs in a bearing supported on a rigid outrigger which also serves as a pulley guard. A locking belt shipper is provided.

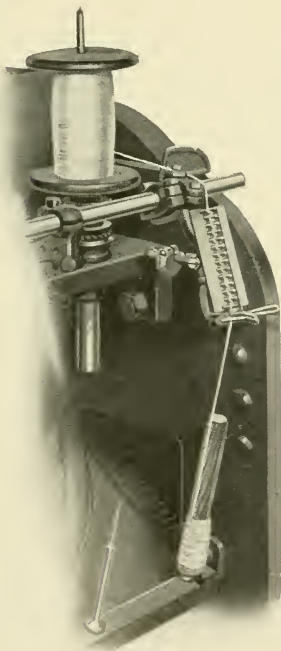
### MODEL C

**This machine** was designed with a view to combine to the best possible advantage all the most valuable points of previous machines with some new and important features. The most important features to be noted in this machine are: The ready accessibility to make necessary adjustments; the wide range of adjustments allowable; the simplicity of operation and the adaptability for maintaining a cleanly appearance to the machine at all times.

**The framing** of the machine is of an unusually solid construction, all parts being of ample proportions to withstand the maximum strains that they may be liable to. The head end is of the well-known "boxed" style fitted with sheet metal doors enclosing the traverse and mangle wheel gearing. This construction renders ready access to all necessary adjustments to the gearing.

**Liability of any injury** to an operative, when making adjustments or changing the gears, by the unexpected starting of the machine is entirely avoided by the use of a simple device which locks the belt shipping mechanism so that it is impossible to start the machine in motion while the doors are open.

**Adjustable feet** are provided on the foot end and also on all of the sampsons, thereby giving ready means for levelling the machine on the mill floor.



Grid Tension

**The spindles** are tape driven, thus insuring uniform speed and consequently properly wound spools. If preferred, however, the machine may be equipped with band driven spindles.

**The thread guides**, bobbin holders and thread tensions are the same as applied to Model B machine.

**The traverse** of the thread guide rods is accomplished by means of a shaft on each side of the machine on which are fixed pinions which mesh with rack teeth cut in the lifter rods. Breakage of the mangle or gearing connections by a stray spool or other obstruction under the descending lifter rods is absolutely prevented by a slip-coupling on each traverse shaft gear.

**The traverse** on either side of the machine is independently adjustable with relation to the mangle wheel settings. The mangle wheel provided with steel pins runs in oil, thus insuring ease in running and freedom from breakage and excessive wear.

**Novel means** are provided whereby the crown of the spool may be varied to suit necessary mill requirements.

**The machine** is fitted as ordered with any one of the following equipments:

**Type No. 1.**—Side shelves and empty bobbin carrier.

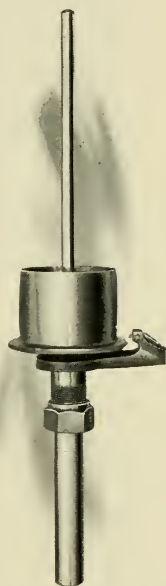
**Type No. 2.**—Side shelves and traversing supply bobbin carrier.

**Type No. 3.**—Side shelves without boxes or empty bobbin carrier.

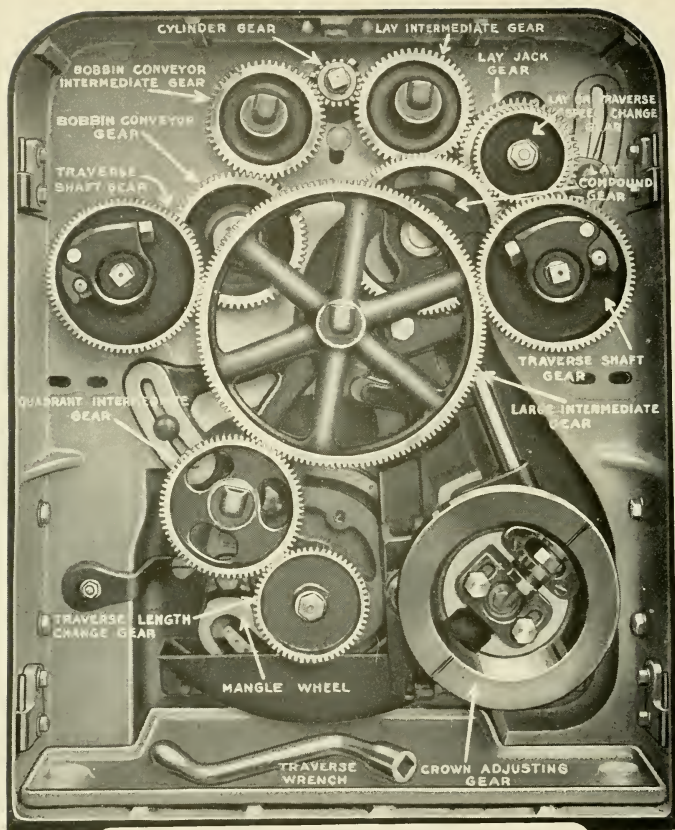
**Type No. 4.**—Side steel boxes and empty bobbin carrier.

**Type No. 5.**—Side steel boxes without empty bobbin carriers.

**Type No. 6.**—Side steel boxes and traversing supply bobbin carriers.

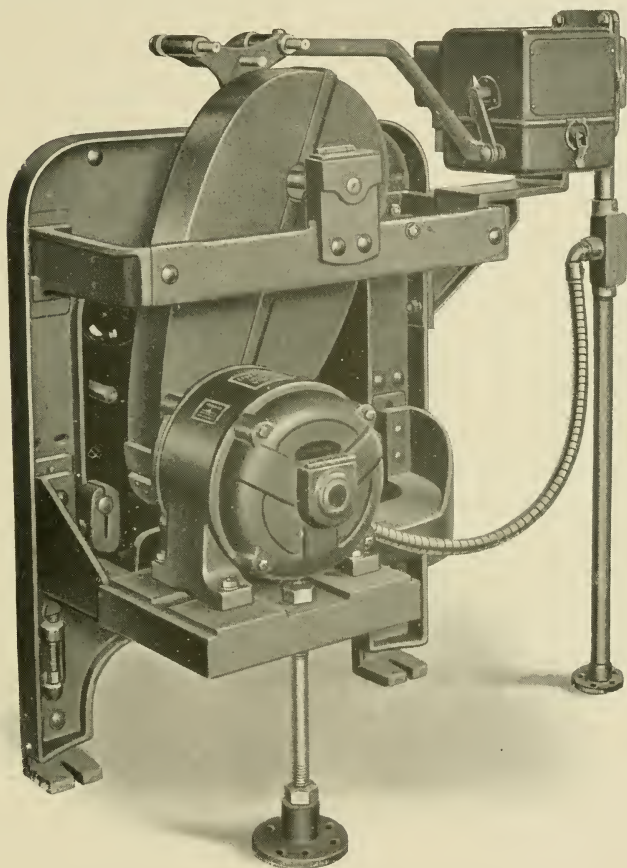


**Tape Drive Spindle**



Gearing of Model C Spooler.

**Driving Pulleys** 8" to 14" diameter by 2½" face and run one revolution to 2.55 revolutions of 3⅛" whirl driven by 8" cylinder with tape drive.



#### Geared Motor Drive

**Production:** See table, page 140. **Floor Space:** See pages 136 and 138.

**Power required:** 200 spindles per horsepower.

#### Weights per foot in length:

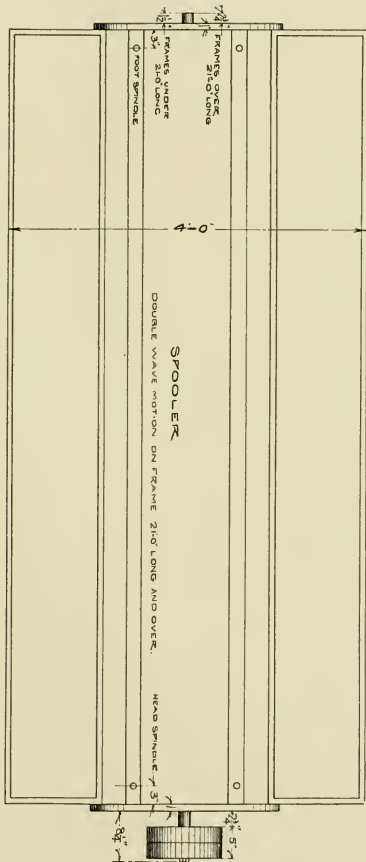
	Model B	Model C
Domestic Net.....	150 pounds.....	200 pounds
Domestic Gross .....	160 " .....	222 "
Export Gross .....	200 " .....	260 "
Export Cubic Feet .....	6 " .....	6.3

# MODEL B SPOOLER

## Floor Space.

No. of Spindles	3½ in. Space.		4 in. Space.		4½ in. Space.		5 in. Space.		5½ in. Space.		5½ in. Space.		6 in. Space.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
40	7	1½	7	9¾	8	7½	9	4¾	9	9½	10	2¼	10	11¾
50	8	5¾	9	5¾	10	5¾	11	5¾	11	11¾	12	5¾	13	5¾
60	9	11¾	11	1¾	12	4¾	13	6¾	14	2	14	9¼	15	11¾
70	11	4¾	12	1¾	14	2¾	15	11½	16	4½	17	3½	18	5¾
80	12	10½	13	8	15	3½	16	11½	17	6¾	19	4¼	20	11¾
90	14	3¾	15	2¾	16	1¾	17	11¾	18	8¾	20	2	22	7
100	15	9¼	16	9½	17	10¾	19	10¾	20	8¾	21	9	23	1
110	17	2¾	18	4¾	19	10¾	20	10½	22	1¼	24	1½	25	¾
126	18	8¼	20	5¾	21	10	22	11½	24	2½	26	4	27	5½
130	20	13½	21	3	22	8¾	24	11½	26	2	27	7½	29	10¼
140	21	7¼	24	7	25	7	26	11	28	3	30	11	32	3
150	23	2	24	8½	27	1½	28	10¾	30	4	31	2½	33	7
160	24	7½	26	3¾	27	9½	30	10½	32	5	33	2½	34	7¾
170	26	1	27	11	31	2¾	32	10½	35	6	37	6	38	7
180	27	6½	29	4¾	31	4	34	10½	36	11½	37	9½	39	5¼
190	29	0	30	11½	33	1¾	36	9¾	38	4	40	1	41	10
200	30	5½	32	6¾	34	10½	38	9	40	8	42	4½	44	2¾
						8½	40	9¼	42	8½	44	8	46	1
						3	40	9¼	42	10	46	11½	48	7
											49	¾	51	1

Double Wave Motion used on Frames 21' 0" and over.



Floor Plan Model B Spooler

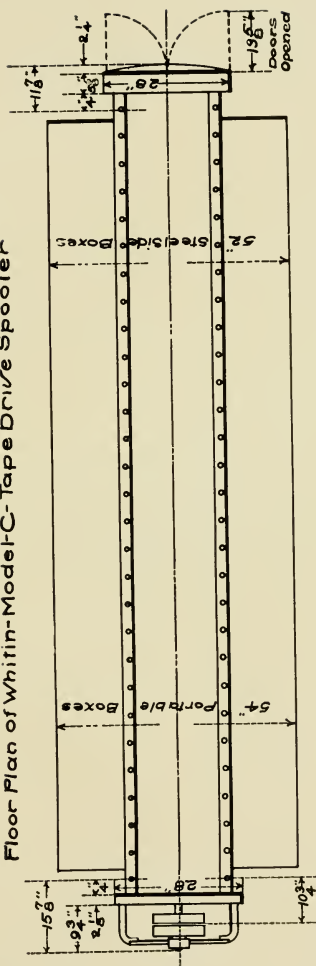


# LENGTH OF MODEL C FRAMES OVER-ALL NOT INCLUDING OPENED HEAD END DOORS

No. Spin.	3 1/2"	3 3/4"	4"	4 1/4"	4 1/2"	4 3/4"	5"	5 1/4"	5 1/2"	5 3/4"	6"	6 1/4"	6 1/2"	6 3/4"	7"	7 1/4"	7 1/2"
40	7'-10 1/4"	8'-3"	8'-7 3/4"	9'-0 1/2"	9'-5 1/4"	9'-10"	10'-2 3/4"	10'-7 1/2"	11'-0 1/4"	11'-5"	11'-9 3/4"	12'-2 1/2"	12'-7 1/4"	13'-0"	13'-4 3/4"	13'-9 1/2"	14'-2 1/4"
44	8'-5 1/4"	8'-10 1/2"	9'-3 3/4"	9'-9"	10'-2 1/4"	10'-7 1/2"	11'-0 3/4"	11'-6"	12'-10 1/4"	13'-4 1/2"	12'-0 3/4"	13'-3"	13'-8 1/4"	14'-1 1/2"	14'-6 3/4"	15'-0"	15'-5 1/4"
48	9'-0 1/4"	9'-6"	9'-11 3/4"	10'-5 1/2"	10'-11 1/4"	11'-5"	11'-10 3/4"	12'-4 1/2"	12'-10 1/4"	13'-4"	13'-0 3/4"	14'-3 1/2"	14'-9 1/4"	15'-3"	15'-8 3/4"	16'-2 1/2"	16'-8 1/4"
52	9'-7 1/4"	10'-1 1/2"	10'-7 3/4"	11'-2"	11'-8 1/4"	12'-2 1/2"	12'-8 3/4"	13'-3"	13'-9 1/4"	14'-3 1/2"	14'-0 3/4"	15'-4"	15'-10 1/4"	16'-4 1/2"	16'-10 1/4"	17'-5"	17'-11 1/4"
56	10'-2 1/4"	10'-9"	11'-3 3/4"	11'-10 1/2"	12'-5 1/4"	13'-0"	13'-6 3/4"	14'-1 1/2"	14'-8 1/4"	15'-3"	15'-9 3/4"	16'-4 1/2"	17'-0 1/4"	17'-6 1/2"	18'-0 1/4"	18'-7 1/2"	19'-2 1/4"
60	10'-9 1/4"	11'-4 1/2"	11'-11 1/4"	12'-7"	13'-2 1/4"	13'-9 1/2"	14'-4 3/4"	15'-0"	15'-7 1/4"	16'-2 1/2"	16'-9 3/4"	17'-5"	18'-0 1/4"	18'-7 1/2"	19'-2 1/4"	19'-10"	20'-5 1/4"
64	11'-4 1/4"	12'-0"	12'-7 3/4"	13'-3"	13'-11 1/4"	14'-7"	15'-2 3/4"	15'-10 1/2"	16'-6 1/4"	17'-2"	17'-9 3/4"	18'-5 1/2"	19'-1 1/4"	19'-9 1/4"	20'-4 3/4"	20'-12 1/2"	21'-8 1/4"
68	11'-11 1/4"	12'-7 1/2"	13'-3 3/4"	14'-0"	14'-8 1/4"	15'-4 1/2"	16'-0 3/4"	16'-9"	17'-5 1/4"	18'-1 1/2"	18'-9 3/4"	19'-6"	20'-2 1/4"	20'-10 1/2"	21'-6 3/4"	22'-3 1/2"	23'-11 1/4"
72	12'-6 1/4"	13'-3"	13'-11 3/4"	14'-8 1/2"	15'-5 1/4"	16'-2"	16'-10 3/4"	17'-7 1/2"	18'-4 1/4"	19'-1"	19'-9 3/4"	20'-6 1/2"	21'-3 1/4"	22'-0"	22'-8 3/4"	23'-5 1/2"	24'-2 1/4"
76	13'-1 1/4"	13'-10 1/2"	14'-7 3/4"	15'-5"	16'-2 1/4"	16'-11 1/2"	17'-8 3/4"	18'-6"	19'-3 1/4"	20'-0 1/2"	20'-9 3/4"	21'-7 1/2"	22'-4 1/4"	23'-1 1/2"	23'-10 3/4"	24'-8"	25'-5 1/4"
80	13'-8 3/4"	14'-6"	15'-3 3/4"	16'-1 1/2"	16'-11 1/4"	17'-9"	18'-6 3/4"	19'-4 1/2"	20'-2 1/4"	21'-0"	21'-9 3/4"	22'-7 1/2"	23'-4 1/4"	24'-3"	25'-0 3/4"	25'-10 1/2"	26'-8 1/4"
84	14'-3 3/4"	15'-1 1/2"	15'-11 3/4"	16'-10"	17'-8 1/4"	18'-6 1/2"	19'-4 3/4"	20'-3"	21'-1 1/4"	22'-11 1/2"	23'-0 3/4"	23'-8"	24'-6 1/4"	25'-4 1/2"	26'-2 3/4"	27'-1"	27'-11 1/4"
88	14'-10 1/4"	15'-9"	16'-7 3/4"	17'-6 1/2"	18'-5 1/4"	19'-4"	20'-2 3/4"	21'-1 1/2"	22'-0 1/4"	22'-11 1/2"	23'-0 3/4"	24'-8 1/4"	25'-7 1/4"	26'-6"	27'-4 3/4"	28'-3 1/2"	29'-1 1/4"
92	15'-5 1/4"	16'-4 1/2"	17'-3 3/4"	18'-3"	19'-2 1/4"	20'-1 1/2"	21'-0 3/4"	22'-0"	22'-11 1/4"	23'-10 1/2"	24'-9 3/4"	25'-9"	26'-8 1/4"	27'-7 1/2"	28'-6 3/4"	29'-5 1/4"	30'-3 1/4"
96	16'-0 1/4"	17'-0"	17'-11 3/4"	18'-11 1/2"	19'-11 1/4"	20'-11"	21'-10 3/4"	22'-10 1/2"	23'-10 1/4"	24'-10"	25'-9 3/4"	26'-9 1/2"	27'-9 1/4"	28'-9"	29'-8 3/4"	30'-8 1/2"	31'-8 1/4"
100	16'-7 1/4"	17'-7 1/2"	18'-7 3/4"	19'-8"	20'-8 1/4"	21'-8 1/2"	22'-8 3/4"	23'-9"	24'-9 1/4"	25'-9 1/2"	26'-9 3/4"	27'-10"	28'-10 1/4"	29'-10 1/2"	30'-10 3/4"	31'-11"	32'-11 1/4"
104	17'-2 1/4"	18'-3"	19'-3 3/4"	20'-4 1/2"	21'-5 1/4"	22'-6"	23'-6 3/4"	24'-7 1/2"	25'-8 1/4"	26'-9"	27'-9 3/4"	28'-10 1/2"	29'-11 1/4"	30'-11"	31'-11 1/2"	32'-11 3/4"	33'-1 1/4"
108	17'-9 1/4"	18'-10 1/2"	19'-11 3/4"	21'-1"	22'-2 1/4"	23'-3 1/2"	24'-4 3/4"	25'-6"	26'-7 1/4"	27'-8 1/2"	28'-9 3/4"	29'-11"	30'-11 1/4"	31'-0"	32'-0 3/4"	33'-1 1/2"	34'-2 1/4"
112	18'-4 1/4"	19'-6"	20'-7 3/4"	21'-9 1/2"	22'-11 1/4"	24'-1"	25'-2 3/4"	26'-4 1/2"	27'-6 1/4"	28'-8"	29'-9 3/4"	30'-11 1/2"	31'-1 1/4"	32'-1 1/2"	33'-2 3/4"	34'-4"	35'-5 1/4"
116	18'-11 1/4"	20'-1 1/2"	21'-3 3/4"	22'-6"	23'-8 1/4"	24'-10 1/2"	26'-0 3/4"	27'-3"	28'-5 1/4"	29'-7 1/2"	30'-9 3/4"	32'-0"	33'-2 1/4"	34'-4 1/2"	35'-6 3/4"	36'-9"	37'-11 1/4"
120	19'-6 1/4"	20'-9"	21'-11 3/4"	23'-2 1/2"	24'-5 1/4"	25'-8"	26'-10 3/4"	28'-1 1/2"	29'-4 1/4"	30'-7"	31'-9 3/4"	33'-0 1/2"	34'-3 1/4"	35'-6"	36'-8 3/4"	37'-10 3/4"	39'-2 1/4"
124	20'-1 1/4"	21'-4 1/2"	22'-7 3/4"	23'-11"	25'-2 1/4"	26'-5 1/2"	28'-3 3/4"	29'-0"	30'-3 1/4"	31'-6 1/2"	32'-9 3/4"	34'-1"	35'-4 1/4"	36'-7 1/2"	37'-10 3/4"	39'-2 1/4"	40'-5 1/4"
128	20'-8 1/4"	22'-0"	23'-3 3/4"	24'-7 1/2"	25'-11 1/4"	27'-3"	28'-6 3/4"	29'-10 1/2"	30'-3 1/4"	32'-6"	33'-9 3/4"	35'-1 1/2"	36'-5 1/4"	37'-9 1/2"	38'-12 1/2"	40'-1 1/2"	41'-8 1/4"
132	21'-3 1/4"	23'-7 1/2"	24'-11 3/4"	25'-4"	26'-8 1/4"	28'-0 1/2"	29'-4 3/4"	30'-9"	32'-1 1/4"	33'-4 1/2"	34'-9 3/4"	36'-2"	37'-6 1/4"	38'-10 1/2"	40'-2 3/4"	41'-7"	42'-11 1/4"
136	21'-10 1/4"	23'-3"	24'-7 3/4"	26'-0 1/2"	27'-5 1/4"	28'-10"	30'-2 3/4"	31'-7 1/2"	33'-0 1/4"	34'-5"	35'-9 3/4"	37'-2 1/2"	38'-7 1/4"	40'-0"	41'-4 1/4"	42'-9 1/2"	44'-2 1/4"
140	22'-5 1/4"	23'-10 1/2"	25'-3 3/4"	26'-0"	28'-2 1/4"	29'-7 1/2"	31'-0 3/4"	33'-6"	33'-11 1/4"	35'-4 1/2"	36'-9 3/4"	38'-3"	38'-8 1/4"	41'-1 1/2"	42'-6 3/4"	44'-0"	45'-5 1/4"
144	23'-0 1/4"	24'-6"	25'-11 3/4"	27'-5 1/2"	28'-11 1/4"	30'-5"	31'-10 3/4"	33'-4 1/2"	34'-10 1/4"	36'-4"	37'-9 3/4"	39'-3 1/2"	40'-9 1/4"	42'-3"	43'-8 3/4"	45'-2 1/2"	46'-8 1/4"
148	23'-7 1/4"	25'-1 1/2"	26'-7 3/4"	28'-2"	29'-8 1/4"	31'-2 1/2"	32'-8 3/4"	34'-3"	35'-9 1/4"	36'-4"	38'-0 3/4"	40'-4"	41'-10 1/4"	43'-4 1/2"	44'-10 3/4"	46'-5 1/2"	47'-11 1/4"
152	24'-2 1/4"	25'-9"	27'-3 3/4"	28'-10 1/2"	30'-5 1/4"	32'-0"	33'-6 3/4"	35'-1 1/2"	36'-8 1/4"	38'-3"	39'-9 3/4"	41'-4 1/2"	42'-11 1/4"	44'-6"	46'-0 3/4"	47'-7 1/2"	49'-2 1/4"
156	24'-9 1/4"	26'-4 1/2"	27'-11 3/4"	29'-7"	31'-2 1/4"	32'-9 1/2"	34'-4 3/4"	36'-0"	37'-7 1/4"	39'-2 1/2"	41'-9 3/4"	42'-5"	44'-0 1/4"	45'-7 1/2"	47'-2 3/4"	48'-10"	50'-5 1/4"
160	25'-4 1/4"	27'-0"	28'-7 3/4"	30'-3 1/2"	31'-11 1/4"	33'-7"	35'-2 3/4"	36'-10 1/2"	38'-6 1/4"	40'-2"	41'-9 3/4"	43'-5 1/2"	44'-10 1/4"	46'-9"	48'-4 3/4"	50'-0 1/2"	51'-8 1/4"
164	25'-11 1/4"	27'-7 1/2"	29'-3 3/4"	31'-0"	32'-8 1/4"	34'-4 1/2"	36'-0 3/4"	37'-9"	39'-5 1/4"	41'-1 1/2"	42'-9 3/4"	44'-6 1/2"	46'-2 1/4"	48'-0"	49'-6 3/4"	51'-3"	52'-9 1/4"
168	26'-6 1/4"	28'-3"	29'-11 3/4"	31'-8 1/2"	33'-5 1/4"	35'-2"	36'-10 3/4"	38'-7 1/2"	40'-4 1/4"	42'-1"	43'-9 3/4"	45'-6 1/2"	47'-3 1/4"	49'-0"	50'-8 3/4"	51'-10 3/4"	52'-11 1/4"
172	27'-1 1/4"	28'-6"	30'-3 3/4"	32'-5"	34'-2 1/4"	35'-11 1/2"	36'-9"	38'-6"	41'-3 1/4"	43'-0 1/2"	44'-9 3/4"	46'-7"	48'-4 1/4"	50'-1 1/2"	51'-10 3/4"	52'-11 1/4"	53'-7 1/4"
176	27'-8 1/4"	29'-1 1/2"	30'-7 3/4"	32'-11 1/2"	34'-11 1/4"	36'-9"	38'-6 3/4"	41'-4 1/2"	43'-1 1/4"	44'-11 1/2"	46'-9 3/4"	48'-8"	50'-6 1/4"	51'-10 3/4"	52'-11 1/4"	53'-7 1/4"	54'-3 1/4"
180	28'-3 1/4"	30'-1 1/2"	31'-11 3/4"	33'-10"	35'-8 1/4"	37'-6 1/2"	39'-4 3/4"	41'-3"	43'-1 1/4"	44'-11 1/2"	46'-9 3/4"	48'-8"	50'-6 1/4"	51'-10 3/4"	52'-11 1/4"	53'-7 1/4"	54'-3 1/4"
184	28'-10 1/4"	30'-9"	32'-7 3/4"	34'-6 1/2"	36'-5 1/4"	38'-4"	40'-2 3/4"	42'-0"	43'-1 1/4"	44'-11 1/2"	46'-9 3/4"	48'-8"	50'-6 1/4"	51'-10 3/4"	52'-11 1/4"	53'-7 1/4"	54'-3 1/4"
188	29'-5 1/4"	31'-4 1/2"	33'-1 1/4"	35'-1 1/2"	36'-9 1/4"	38'-4"	40'-2 3/4"	42'-0"	43'-1 1/4"	44'-11 1/2"	46'-9 3/4"	48'-8"	50'-6 1/4"	51'-10 3/4"	52'-11 1/4"	53'-7 1/4"	54'-3 1/4"
192	30'-0 1/4"	32'-0"	33'-11 3/4"	35'-11 1/2"	37'-11 1/4"	39'-11"	41'-10 3/4"	43'-10 1/2"	45'-10 1/4"	47'-10"	48'-9 1/2"	50'-9 3/4"	51'-9 1/2"	52'-10 1/2"	53'-10 3/4"	54'-4 1/4"	55'-1 1/4"
196	30'-7 1/4"	32'-7 1/2"	34'-7 3/4"	36'-8 1/2"	38'-8 1/4"	40'-8 1/2"	42'-8 3/4"	44'-9"	46'-9 1/4"	48'-9 1/2"	50'-9 3/4"	51'-9 1/2"	52'-10 1/2"	53'-10 3/4"	54'-4 1/4"	55'-1 1/4"	56'-1 1/4"
200	31'-2 1/4"	33'-3"	35'-3 3/4"	37'-4 1/2"	39'-5 1/4"	41'-6"	43'-6 3/4"	45'-7 1/2"	47'-8 1/4"	49'-9"	51'-9 3/4"	52'-10 1/2"	53'-10 3/4"	54'-4 1/4"	55'-1 1/4"	56'-1 1/4"	57'-1 1/4"



Floor Plan of Whitin-Model-C-Tape Drive Spooler



## Production Table of Spooler

Dimensions of Spools.		Number of Yarn.	Revolutions per Minute of			No. Whitin Gravity Spindles to one Spooler Spindle at 825 Rev.
Length between Heads.	Diameter of Heads.		Spindle 750	Spindle 825	Spindle 900	
			Pounds per Day per Spindle.			
6 in.	5 in.	{ 8	13.8	11.8	12.9	12
		{ 10	8.6	9.5	10.3	
		{ 12	7.2	7.9	8.6	
		{ 14	6.2	6.8	7.4	
		{ 16	5.4	5.9	6.5	
		{ 18	4.8	5.3	5.8	13
		{ 20	4.3	4.8	5.2	
		{ 22	3.9	4.3	4.7	
		{ 24	3.6	4.0	4.3	
		{ 26	3.3	3.7	4.0	
5 in.	4 in.	{ 28	3.1	3.4	3.7	14
		{ 30	2.9	3.2	3.5	
		{ 32	2.7	3.0	3.3	
		{ 34	2.6	2.8	3.1	
		{ 36	2.4	2.7	2.9	
		{ 38	2.3	2.5	2.7	15
		{ 40	2.2	2.4	2.6	
		{ 44	2.0	2.2	2.4	
		{ 50	1.8	1.9	2.1	
		{ 60	1.5	1.6	1.8	
4½ in.	3½ in.	{ 70	1.3	1.4	1.5	16
		{ 80	1.1	1.2	1.3	
		{ 90	1.0	1.1	1.2	
3½ in.	3¼ in.	{ 100	.9	1.0	1.1	17
3 in.	2¾ in.					18
						19
						20
						21
						22
						23
						24
						25
						26
						27
						28
						29
						30

# TWISTING

## COTTON RING TWISTING FRAMES

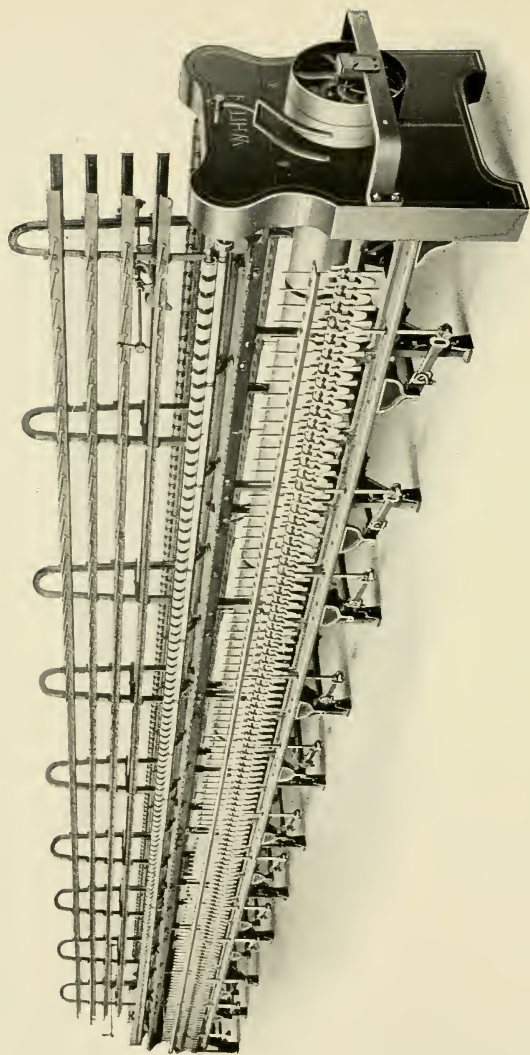
**The Whitin Twisting Frames** are the outcome of nearly a century of experience in the making of textile machinery. Ever since 1831 when the organization that is now the Whitin Machine Works came into existence, the aim has been to produce textile machinery of the highest quality. Today Whitin machinery is known amongst textile manufacturing interests throughout the world as being dependable in producing maximum efficiency in operation, durability and productive abilities.

To meet the requirements of yarn manufacturers we make three types of cotton twisters, viz: Regular, Heavy and Extra Heavy. These comprise four models, viz.: Model A, Model B, Model C and Model D. These models are equipped for either dry or wet twisting as ordered, detailed descriptions of which are given in the following pages.

**The standard of proportions** that enters into the designs of these machines is the result of what has been deemed best for practical working mill conditions. The general assembly of parts is so well balanced that the machines efficiently meet every condition which arises in the production of twisted yarns. They are easy and convenient to operate, changes in gearing are easily made, and all mechanisms are readily accessible.

# Types and Dimensions of Whitin Ring Twisters

Type	Width	Space	Max. Diam. of Ring	Max. Diam. of Bobbin	Width of Side Rails	Diam. of Lifting Rods	Traverse
Regular	36"	2¾"	1⅝"	1½"	2⅝"	¾"	5"-7"
		3"	2"	1⅞"	2⅝"	¾"	5"-7"
		3¼"	2¼"	2⅛"	2⅝"	¾"	5"-7"
	39"	3½"	2½"	2⅜"	2⅝"	¾"	5"-7"
		3¾"	2¾"	2⅝"	2⅝"	¾"	5"-7"
		4"	3"	2⅞"	2⅝"	¾"	5"-7"
	42"	4½"	3½"	3⅜"	2⅝"	¾"	5"-7"
		5"	4"	3¾"	2⅝"	¾"	5"-7"
		5½"	4½"	4¼"	2⅝"	¾"	5"-7"
Heavy	42"	5"	3¾"	3½"	3⅜"	1⅝ <sub>16</sub> "	6"-8"
		5½"	4¼"	4"	3⅜"	1⅝ <sub>16</sub> "	6"-8"
		6"	4½"	4¼"	3⅜"	1⅝ <sub>16</sub> "	6"-8"
		6½"	5"	4¾"	3⅜"	1⅝ <sub>16</sub> "	6"-8"
Extra Heavy	42"	6½"	5"	4¾"	3⅜"	1⅝"	7"-9"
		7"	5½"	5"	3⅜"	1⅝"	7"-9"
		7½"	6"	5½"	3⅜"	1⅝"	7"-9"
		8"	6½"	6"	3⅜"-4"	1⅝"	7"-9"
		8½"	6¾"	6¼"	4"	1⅜"	8"-10"
		9"	7¼"	6½"	4"	1⅜"	8"-10"
		9½"	7½"	6¾"	4"	1⅜"	8"-10"
		10"	7¾"	7"	4"	1⅜"	8"-10"



Twisting Frame, Model A, with Band Driven Spindles

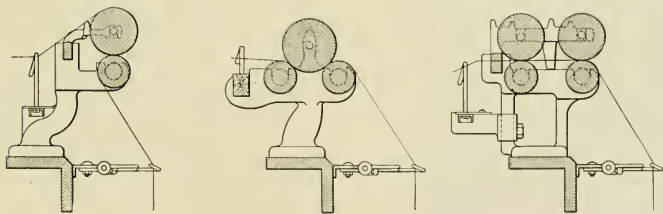
## MODEL A

### REGULAR TWISTER

**This machine**, designed for light work, is very strong and substantially built either 36 inches or 39 inches wide, from  $2\frac{1}{2}$  inches to  $4\frac{1}{2}$  inches space, is equipped with band driven spindles and rings best adapted for any required duty. Traverse adjustable from 5 to 7 inches. Adjustable feet are provided for the sampsons and foot ends in order to facilitate the levelling of the frame.

**The Spool creel** is made for any number of ply desired and consists of cast iron uprights supporting skewer rails of angle iron, rigidly held in position, easily adjusted or removed.

**The twist and builder motion** gearings are enclosed in the boxed end, easily accessible by removable panels held in position by an efficient locking device. All gearing is machine cut, thus ensuring comparatively silent running. A wide range in twist combinations is afforded by the change gearing. If so specified, the twist gearing may be arranged so that each side of the frame is driven independent of the other, thus producing two different twists simultaneously.



Arrangement of Twister Rolls

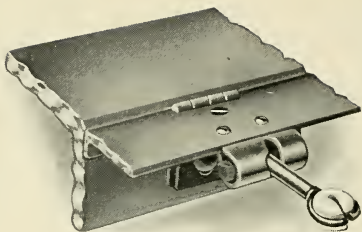
**The rolls** are furnished in three styles, viz.: two lines of bottom rolls, with a single line of top rolls, generally used for heavy dry twisting; a single line of bottom rolls with a single line of top rolls adapted for either dry or wet twisting, and also double line of bottom and double line top rolls for fancy yarns. For dry twisting, the bottom rolls are of steel and the top rolls of cast iron, whereas for wet twisting both top and bottom rolls are of brass or brass covered, which, being non-corrosive, prevents staining of the yarn.



A **traverse motion** for preventing creasing of the rolls by the yarn is provided.

The **thread boards** are of highly polished wood unless boards of metallic construction are ordered. Any of the usual forms of wire or porcelain guides furnished as desired.

A **yardage motion** may be applied if desired by means of which the frame is stopped when a predetermined number of yards has been wound on the bobbins. Hank Clocks also may be readily attached to the machines.

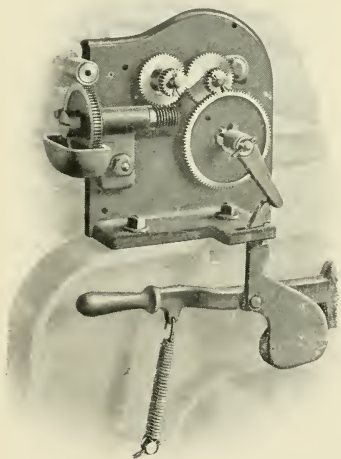


**Metallic Thread Board.**

For **dry twisting**, the guides, hinges and screws are of steel, whereas, for wet twisting, these parts are of brass. A thread board lifter is applied on each side of the frame whereby all the guides may be lifted together preparatory to doffing the frame.

The **spindles** with which the frame is equipped are band driven Whitin Gravity Type of a size best suited for the requirements. (See specifications of Spindles on page 157.)

A simple and effective **knee-brake** is provided for each spindle whereby the motion of the spindle is arrested for the purpose of piecing up.



**Yardage Motion**

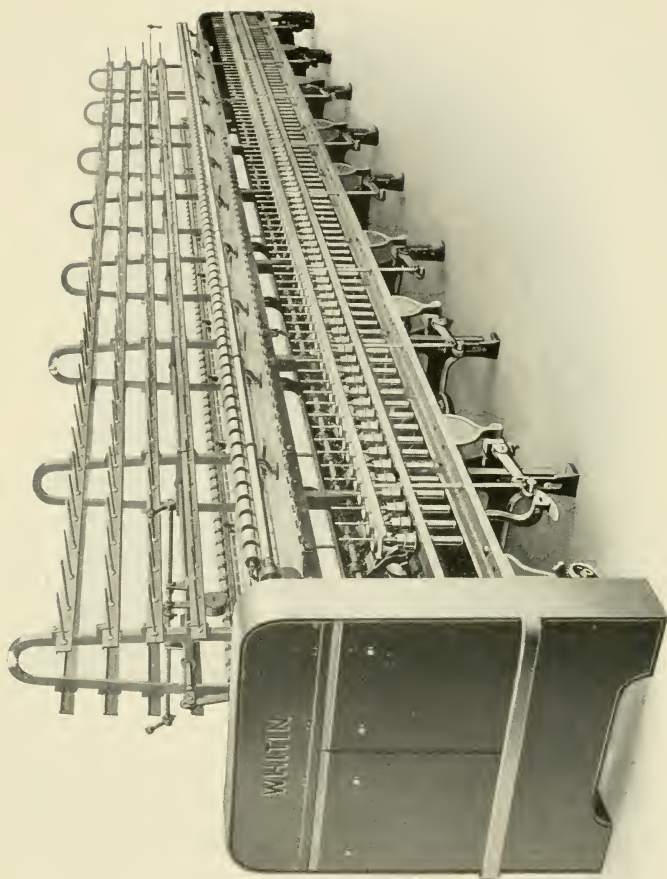
The **builder motion** may be arranged to form bobbins with straight top, taper top, warp or filling winds, the change from one wind to another being quickly and easily accomplished.

**The ring rails** are conveniently levelled by means of an adjusting screw on the lifting arm.

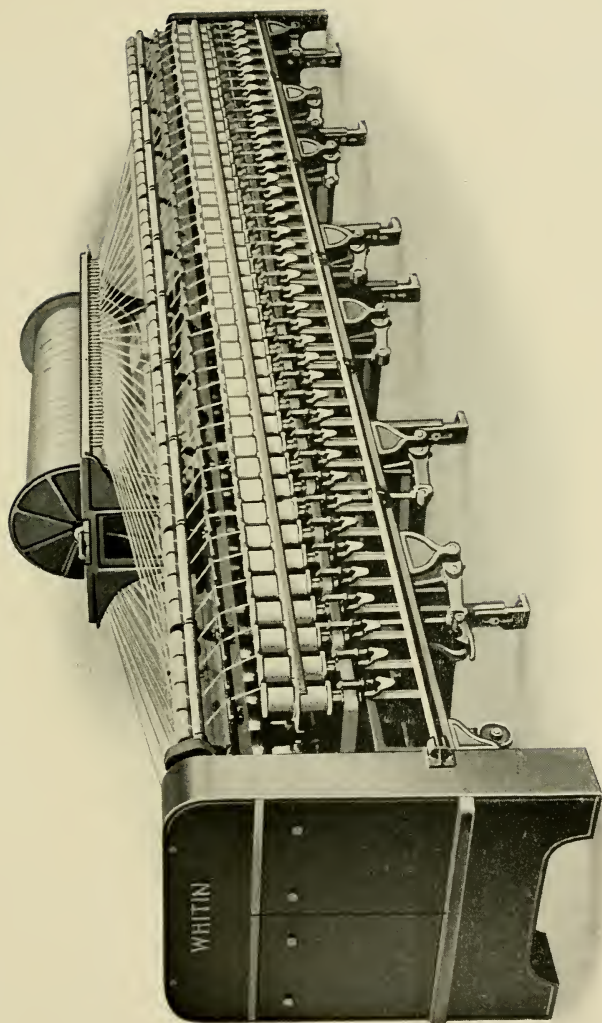
**The cylinders**, seven or eight inches in diameter, are supported in self-oiling boxes so arranged that the cylinders may be readily removed for repairs and returned to place without any readjustments required. Ball or roller bearings for the cylinder may be had if so ordered.

**The driving pulleys** located on either the foot or head end range from six inches to twenty-two inches in diameter with two inches to four inches face. The loose pulley runs on a sleeve which is integral with the yoke box supporting the end of the driving arbor. By this construction, excessive wear is eliminated in the bearing of the loose pulley as it does not revolve when the belt is on the tight pulley. The support of the outer box of the driving arbor also serves as a guard for pulley and belt.

The frames may be arranged, when so ordered, to be driven by an **electric motor**, either by direct connection to the cylinder driving arbor, or by gearing to the same.



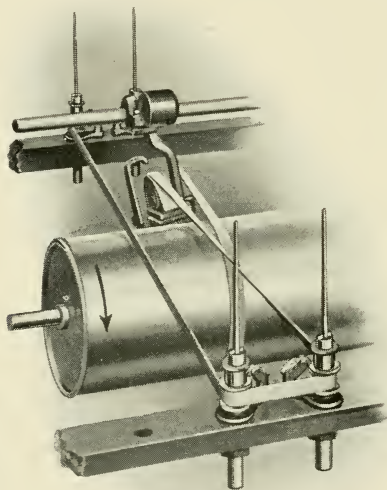
Twisting Frame, Model B, with Tape Driven Spindles.



Model B Twisting Frame with Section Beam Creel.

## MODEL B REGULAR TWISTER

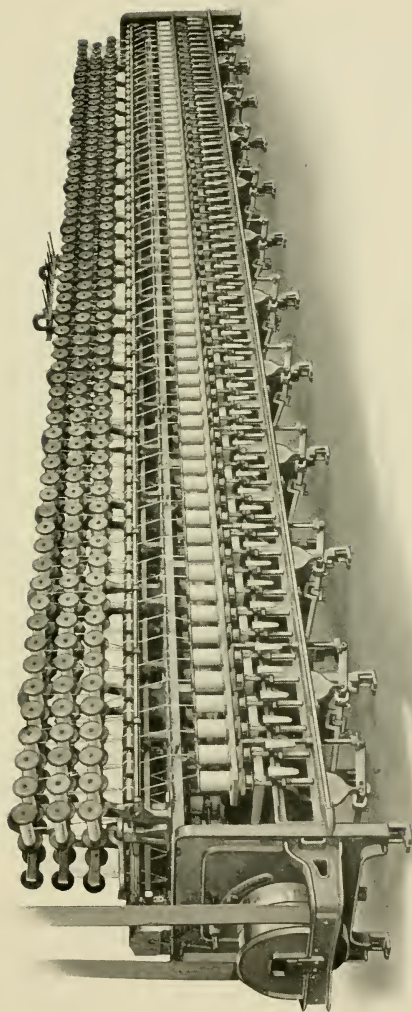
**This machine** in general details is similar to Model A, the exceptions being in the design of the geared end and the equipment being for tape driven spindles only. It is built in widths of 39 inches and 42 inches and any required number of Heavy or Extra Heavy Spindles in 3-inch to 5½-inch spaces, traverse adjustable from 5 to 7 inches, driving pulleys on either head or foot end as ordered.



Tape Drive Spindles

**The twist gearing** inclosed in the boxed end is similar in most respects to Model A, the builder motion, however, being of the worm and gear type, thus reducing the amount of backlash to a minimum.

**The spool creels** are of a like construction to that of Model A, although if a manufacturer desires to twist yarns from section beams, supports of ample strength are provided. For a description of other details, see that of Model A.



Model C Heavy Twister

## MODEL C

### HEAVY TWISTER

**This machine** designed for somewhat heavier work than either Models A or B is 42 inches wide, equipped with any required number of Extra Heavy tape driven spindles in 5 to 6½-inch spaces, with traverse adjustable from 6 to 8 inches. Driving pulleys located on foot end only range from 12 to 20 inches diameter by 4¼-inch face.

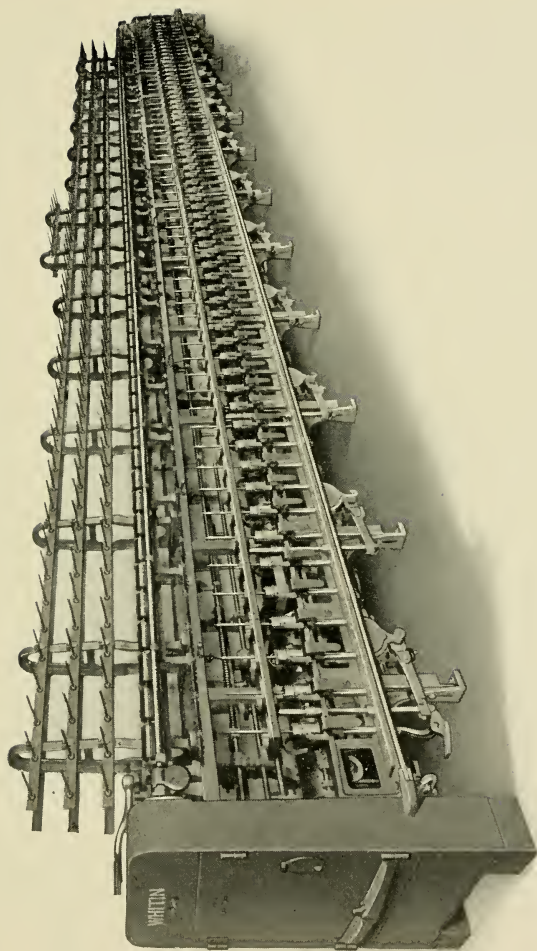
The details of this machine are much heavier than those of Models A and B. **All gearing** is enclosed in a heavy boxed end to which ready access is obtained through swinging doors which are provided with a locking device acting in conjunction with the belt shipping mechanism, thus preventing the unexpected starting of the machine while the doors are open, and the doors cannot be opened while the machine is running, thereby preventing possible injury to the operatives in their work about the machine.

When it is desired to "slaken off" the ends, as is sometimes necessary, a manually operated ring rail **wind-down device** is provided (illustrated on page 155.) This motion comprises a gear in a clutching relation with the gearing driving the builder motion. By means of a crank inserted by the operative in a socket provided in the hub of the gear on which the clutch gear is mounted, the clutch is disengaged, thus disconnecting the builder motion gearing, when the ring rails may be raised or lowered as desired.

**The thread boards** may be any of our usual styles of wood, cast iron, or our patent metallic, as desired, and are fitted with suitable guides to meet requirements.

**The creels** arranged for spools of any number of ply, as desired, or for section beams if preferred.

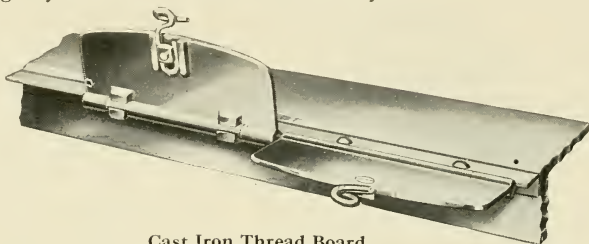




Model D Extra Heavy Twisting Frame

## MODEL D EXTRA HEAVY TWISTER

**This machine** is especially designed for heavy duty required in the twisting of yarns for tire duck or other heavy fabrics.

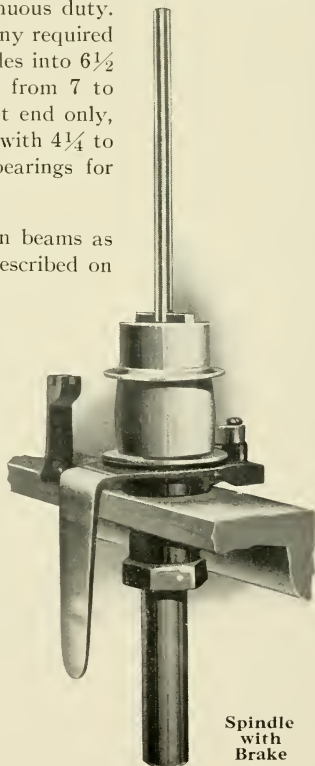


Cast Iron Thread Board

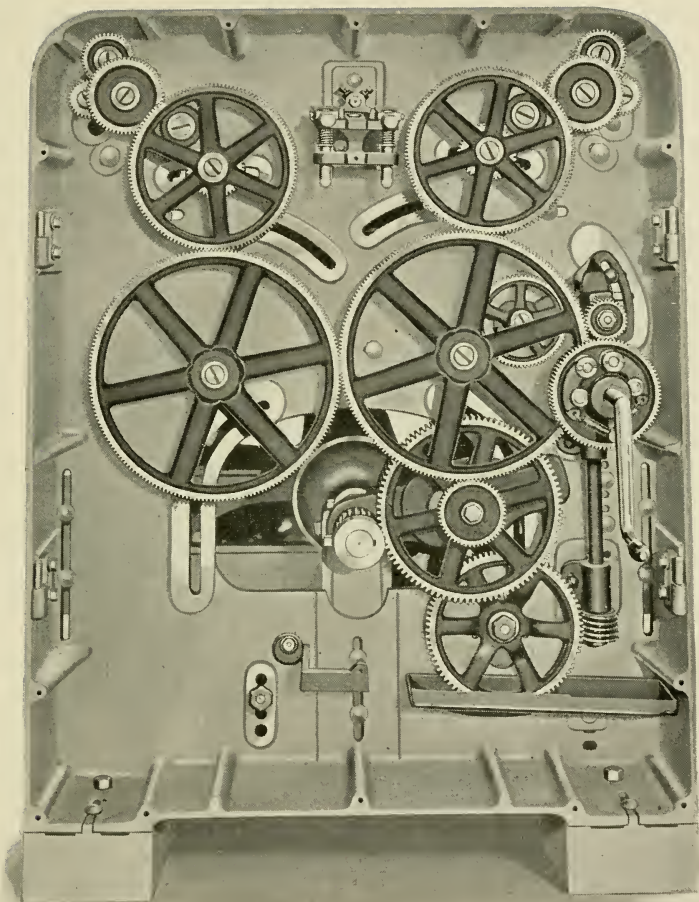
Its rigid construction eliminates all chance of vibration, thus making the machine particularly adapted for strenuous duty. It is built 42 inches wide, equipped with any required number of Extra Heavy tape driven spindles into  $6\frac{1}{2}$  to 10-inch spaces, with traverse adjustable from 7 to 10 inches. Driving pulleys located on foot end only, are furnished in 12 to 20 inches diameters with  $4\frac{1}{4}$  to  $6\frac{1}{4}$ -inches width of face. Ball or roller bearings for the cylinder if desired.

**The creel** may be for spools or section beams as ordered. A ring rail wind-down device, described on page 152, is furnished.

**The bottom rolls**,  $1\frac{1}{2}$ -inches or 2-inches diameter, are arranged in two lines with one line of heavy top rolls. The thread boards are of cast iron of heavy design, and equipped with adjustable thread guides of wire or porcelain. An efficient knee brake is fitted to each spindle. The geared or head end is of similar construction to that of Model C. (See description, page 152.) For the longer traverses, extension blocks are inserted beneath the footings of the end, thus increasing the height of the machine. A **yardage motion**, such as illustrated on page 146, may be had if ordered.



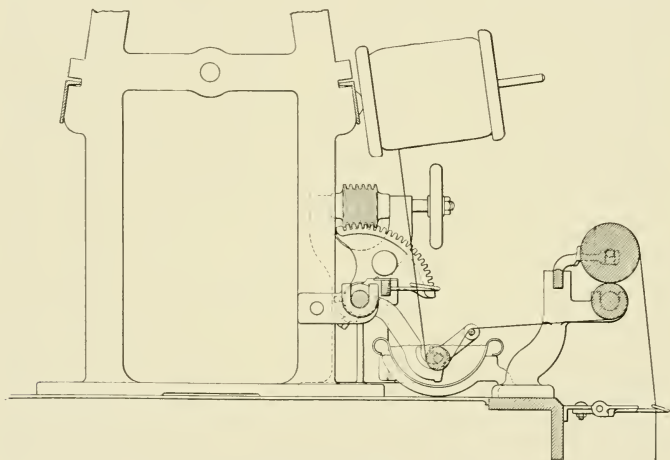
Spindle  
with  
Brake



**Model D Gearing**  
**Showing Ring Rail Wind-Down Motion**

## WET TWISTING

All of our different models of twisters may be arranged for **wet twisting** when so ordered. They are equipped with brass water troughs made in sections, with water tight couplings, and provided with a drainage outlet so that the water may be drawn off when desired. Each trough is fitted with revolvable brass immersion rolls held in open bearings of brass hangers supported by a shaft at back of trough. By a worm and gear arrangement connected to the shaft, the immersion rolls may be lifted out of the trough for cleaning purposes.



**Trough-Roll Lifter**

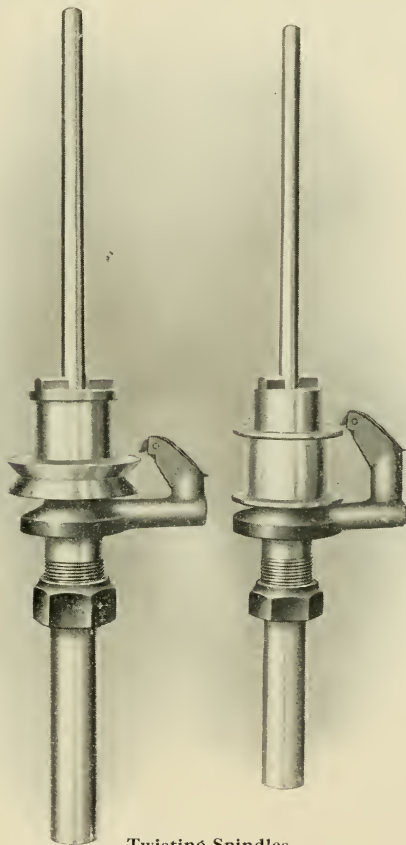
An adjustable **traverse motion** for preventing creasing of the rolls by the yarn is operated by means of a worm and gear driving a cam, thus giving a reciprocating motion to the guide rod. This rod located between the creel and trough is fitted with yarn guides of brass or of other non-corrosive material.

A single line of  $1\frac{1}{2}$ -inch diameter bottom rolls with heavy top rolls is used. The bottom rolls are of steel covered with brass; the top rolls are made of cast iron, brass covered.

**The thread boards** may be of wood or metallic as desired, the guides, hinges and screws being of brass, thus preventing the formation of a rust that might stain the yarn.

## TWISTING SPINDLES

Our twisting frames are usually equipped with the well-known Whitin Gravity type of Spindles fitted for either band or tape driving, and substantially constructed to withstand any work demanded of them. They are made in the following regular sizes, specifications of which are given on the following page.



Twisting Spindles

Light Gravity Spindle, used with rings up to 2" diameter.

Heavy Gravity Spindles, used with rings  $1\frac{3}{4}$ " to  $2\frac{1}{2}$ " diameter.

Extra Heavy Gravity Spindle No. 1, used with rings 2" to  $2\frac{3}{4}$ " diameter.

Extra Heavy Gravity Spindle No. 2, used with rings 2" to  $2\frac{3}{4}$ " diameter.

Extra Heavy Gravity Spindle No. 3, used with rings 3" to  $3\frac{1}{2}$ " diameter.

Extra Heavy Gravity Spindle No. 4, used with rings 3" to  $3\frac{1}{2}$ " diameter.

Extra Heavy Gravity Spindle No. 5, used with rings  $3\frac{1}{2}$ " to 5" diameter.

Extra Heavy Gravity Spindle No. 6, used with rings  $4\frac{3}{4}$ " to  $6\frac{1}{2}$ " diameter.

Extra Heavy Gravity Spindle No. 8, used with rings  $6\frac{1}{4}$ " to  $7\frac{1}{4}$ " diameter.

# RING TWISTING SPINDLES

Spindle	Space	Diam. Ring	Width Tape
Light Gravity Diam. Blade Bearing .362" Diam. Whirl $\frac{7}{8}$ "— $1\frac{5}{16}$ "—1"	$2\frac{3}{4}$ "	$1\frac{1}{4}$ " to $1\frac{3}{8}$ " $1\frac{1}{2}$ " to $1\frac{5}{8}$ "	$\frac{3}{4}$ "
Light Gravity Diam. Blade Bearing .362" Diam. Whirl $1\frac{1}{16}$ "— $1\frac{1}{8}$ "	3" $3\frac{1}{4}$ "	$1\frac{3}{4}$ " to 2" $1\frac{3}{4}$ " to 2"	$\frac{3}{4}$ "
Heavy Diam. Blade Bearing .362" Diam. Whirl $1\frac{5}{16}$ "	3" $3\frac{1}{4}$ " $3\frac{1}{2}$ "	$1\frac{3}{4}$ " to 2" $1\frac{3}{4}$ " to $2\frac{1}{4}$ " 2" to $2\frac{1}{2}$ "	$\frac{3}{4}$ "
Extra Heavy No. 1 Diam. Blade Bearing .426" Diam. Whirl $1\frac{5}{16}$ "	$3\frac{1}{2}$ " $3\frac{3}{4}$ "	2" to $2\frac{1}{2}$ " $2\frac{1}{2}$ " to $2\frac{3}{4}$ "	$\frac{3}{4}$ "
Extra Heavy No. 2 Diam. Blade Bearing .426" Diam. Whirl $1\frac{5}{8}$ "	$3\frac{1}{2}$ " $3\frac{3}{4}$ "	2" to $2\frac{1}{2}$ " $2\frac{1}{2}$ " to $2\frac{3}{4}$ "	$\frac{7}{8}$ "
Extra Heavy No. 3 Diam. Blade Bearing .500" Diam. Whirl 2"	4" $4\frac{1}{2}$ " 5"	3" 3" to $3\frac{1}{4}$ " $3\frac{1}{4}$ " to $3\frac{1}{2}$ "	$1\frac{1}{8}$ "
Extra Heavy No. 4 Diam. Blade Bearing .5625" Diam. Whirl $2\frac{1}{2}$ "	$4\frac{1}{2}$ " 5"	3" to $3\frac{1}{4}$ " $3\frac{1}{2}$ "	$1\frac{1}{2}$ "
Extra Heavy No. 5 Diam. Blade Bearing .5625" Diam. Whirl $2\frac{1}{2}$ "	5" $5\frac{1}{2}$ " 6" $6\frac{1}{2}$ "	$3\frac{1}{2}$ " $3\frac{3}{4}$ " to $4\frac{1}{4}$ " $4\frac{1}{4}$ " to $4\frac{1}{2}$ " $4\frac{3}{4}$ " to 5"	$1\frac{3}{4}$ "
Extra Heavy No. 6 Diam. Blade Bearing .6875" Diam. Whirl 3"	$6\frac{1}{2}$ " 7" $7\frac{1}{2}$ " 8"	$4\frac{3}{4}$ " to 5" $5\frac{1}{4}$ " to $5\frac{1}{2}$ " $5\frac{3}{4}$ " to 6" $6\frac{1}{4}$ " to $6\frac{1}{2}$ "	$1\frac{3}{4}$ "
Extra Heavy No. 8 Diam. Blade Bearing .875" Diam. Whirl 4"	8" $8\frac{1}{2}$ " 9"	$6\frac{1}{4}$ " to $6\frac{1}{2}$ " $6\frac{3}{4}$ " to 7" 7" to $7\frac{1}{4}$ "	$1\frac{3}{4}$ "



# TWISTING RINGS



Band  
Ring



Deep  
Vertical  
Ring



Narrow  
Vertical Ring



Our **twisting frames** are usually equipped with rings of our own make. They are made of the best quality of steel, highly polished, with a hard lustrous finish which presents a suitable bearing surface for the traveler. We can furnish standard sizes of double adjustable, band or vertical type of rings fitted in any style of plate holder desired for both wet or dry twisting.



**Band  
Ring  
in Plate  
Holder.**

## Notice

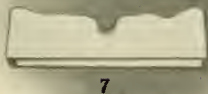
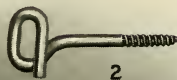
Our customers will avoid delay and the possibility of mistakes by sending sample rings and holders with their orders. We carry an extensive stock of finished rings, and are prepared to fill promptly orders for any of the standard sizes.

## WHITIN TWISTERS

### Shipping Weights Per Foot in Length:

	Model A	Model B	Model D
Domestic Net.....	230 lbs.	296 lbs.	416 lbs.
Domestic Gross .....	260 lbs.	312 lbs.	446 lbs.
Export Gross .....	300 lbs.	346 lbs.	502 lbs.
Cubic Feet .....	6.8	7.8	10.1

## TWISTER THREAD GUIDES



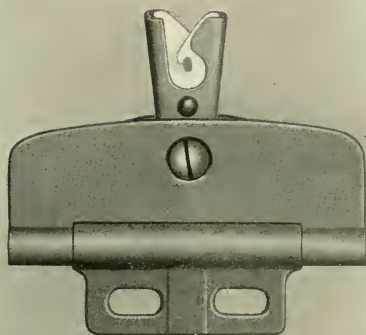
## TWISTER THREAD GUIDES



9



10



11.



12

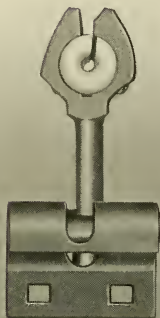


13

## TWISTER THREAD GUIDES



14



15



16



17



18



19



20

# WHITIN TWISTER.

Floor Space:—Width 39 inches and lengths over all for Model B Tape Drive Frames are as follows.

Number of Spindles	6 inch		5½ inch		5 inch		4½ inch		4 inch		3¾ inch		3½ inch		3¼ inch		3 inch		2¾ inch		Number of Spindles
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	
60	17	6	16	3	15	0	13	9	12	6	11	11	11	3	10	8	10	0	9	5	60
64	18	6	17	2	15	10	14	6	13	2	12	6	11	10	11	2	10	6	9	10	64
72	20	6	19	0	17	6	16	0	14	6	13	9	13	0	12	3	11	6	10	8	72
80	22	6	20	10	19	2	17	6	15	10	15	0	14	2	13	4	12	6	11	8	80
84	23	6	21	9	20	0	18	3	16	6	15	8	14	9	13	11	13	0	12	2	84
88	24	6	22	8	20	10	19	0	17	2	16	5	15	4	14	5	13	6	12	7	88
96	26	6	24	6	22	6	20	6	18	6	17	6	16	6	15	6	14	6	13	6	96
104	28	6	26	4	24	2	22	9	19	10	18	9	17	8	16	7	15	6	14	5	104
108	29	6	27	3	25	0	22	9	20	6	19	5	18	3	17	2	16	0	14	11	108
112	30	6	28	2	25	10	23	6	21	2	20	0	18	10	17	8	16	6	15	4	112
120	32	6	30	0	27	6	25	6	22	6	21	3	20	0	18	9	17	6	16	3	120
128	34	6	31	10	29	2	26	6	23	10	22	6	21	2	19	10	18	6	17	2	128
132	35	6	33	2	30	0	27	3	24	6	23	2	21	9	20	5	19	0	17	8	132
144	38	6	35	6	32	6	29	6	26	6	25	0	23	6	22	0	20	6	19	0	144
160	42	6	39	2	35	10	32	6	29	2	27	6	25	10	24	2	22	6	20	10	160
168			41	0	37	6	34	0	30	6	28	9	27	0	25	3	23	6	21	9	168
176					39	2	35	6	31	10	30	0	28	2	26	4	24	6	22	8	176
192					42	6	38	6	34	6	32	6	30	6	28	6	26	6	24	6	192
208							41	6	37	2	35	0	32	10	30	8	28	6	26	4	208
216									38	6	36	3	34	0	31	9	29	6	27	3	216
224									39	10	37	6	35	2	32	10	30	6	28	2	224
240									42	6	40	0	37	6	35	0	32	6	30	0	240
256											42	6	39	10	37	2	34	6	31	9½	256
272													42		40	5	36	6	33	8	272
280																	37	6	34	7	280
288																	38	6	35	6	288
292																	39	0	36	0	292

Above Lengths are for 3-inch Face Pulley;—3½-inch Face, add 1 inch—4-inch Face, add 2 inches. When Belted at Head End subtract 2 inches from above Lengths;—Model A Band Drive Frames are 6 inches shorter than Lengths given above, and are built in 36-inch and 39-inch widths.

# Overall Lengths of Model C.

## 42" HEAVY RING TWISTER

### Foot End Drive Only

Lengths Given Are For 4¼" Face Pulleys. For 6¼" Face Pulleys add 4"

Number of Spindles	5-inch Space		5½-inch Space		6-inch Space		6½-inch Space	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
32	10	2	10	10			12	2
36	11	0	11	9	12	6	13	3
40	11	10	12	8	13	6	14	4
44	12	8	13	7	14	6	15	5
48	13	6	14	6	15	6	16	6
52	14	4	15	5	16	6	17	7
56	15	2	16	4	17	6	18	8
60	16	0	17	3	18	6	19	9
64	16	10	18	2	19	6	20	10
68	17	8	19	1	20	6	21	11
72	18	6	20	0	21	6	23	0
76	19	4	20	11	22	6	24	1
80	20	2	21	10	23	6	25	2
84	21	0	22	9	24	6	26	3
88	21	10	23	8	25	6	27	4
92	22	8	24	7	26	6	28	5
96	23	6	25	6	27	6	29	6
100	24	4	26	5	28	6	30	7
104	25	2	27	4	29	6	31	8
108	26	0	28	3	30	6	32	9
112	26	10	29	2	31	6	33	10
116	27	8	30	1	32	6	34	11
120	28	6	31	0	33	6	36	0
124	29	4	31	11	34	6	37	1
128	30	2	32	10	35	6	38	2
132	31	0	33	9	36	6	39	3
136	31	10	34	8	37	6	40	4
140	32	8	35	7	38	6	41	5
144	33	6	36	6	39	6	42	6
148	34	4	37	5	40	6		
152	35	2	38	4	41	6		
156	36	0	39	3	42	6		
160	36	10	40	2				
164	37	8	41	1				
168	38	6	42	0				
172	39	4						
176	40	2						
180	41	0						
184	41	10						

# Overall Lengths of Model D

42" EXTRA HEAVY RING TWISTER

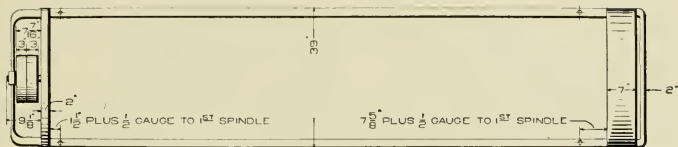
Foot End Drive Only

Lengths Given Are For 4¼" Face Pulleys. For 6¼" Face Pulleys add 4"

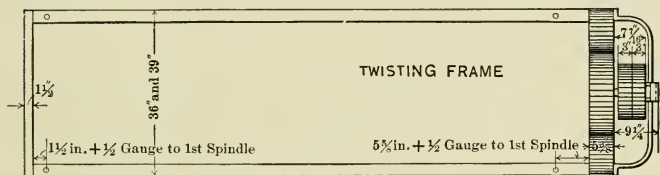
No. of Spls.	6½" Space		7" Space		7½" Space		8" Space		8½" Space		9" Space		9½" Space		10" Space	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
32	12	3	12	11	13	7	14	3	14	11	15	7	16	3	16	11
36	13	4	14	1	14	10	15	7	16	4	17	1	17	10	18	7
40	14	5	15	3	16	1	16	11	17	9	18	7	19	5	20	3
44	15	6	16	5	17	4	18	3	19	2	20	1	21	0	21	11
48	16	7	17	7	18	7	19	7	20	7	21	7	22	7	23	7
52	17	8	18	9	19	10	20	11	22	0	23	1	24	2	25	3
56	18	9	19	11	21	1	22	3	23	5	24	7	25	9	26	11
60	19	10	21	1	22	4	23	7	24	10	26	1	27	4	28	7
64	20	11	22	3	23	7	24	11	26	3	27	7	28	11	30	3
68	22	0	23	5	24	10	26	3	27	8	29	1	30	6	31	11
72	23	1	24	7	26	1	27	7	29	1	30	7	32	1	33	7
76	24	2	25	9	27	4	28	11	30	6	32	1	33	8	35	3
80	25	3	26	11	28	7	30	3	31	11	33	7	35	3	36	11
84	26	4	28	1	29	10	31	7	33	4	35	1	36	10	38	7
88	27	5	29	3	31	1	32	11	34	9	36	7	38	5	40	3
92	28	6	30	5	32	4	34	3	36	2	38	1	40	0	41	11
96	29	7	31	7	33	7	35	7	37	7	39	7	41	7	43	7
100	30	8	32	9	34	10	36	11	39	0	41	1	43	2		
104	31	9	33	11	36	1	38	3	40	5	42	7				
108	32	10	35	1	37	4	39	7	41	10						
112	33	11	36	3	38	7	40	11	43	3						
116	35	0	37	5	39	10	42	3								
120	36	1	38	7	41	1										
124	37	2	39	9	42	4										
128	38	3	40	11												
132	39	4	42	1												
136	40	5														
140	41	6														
144	42	7														



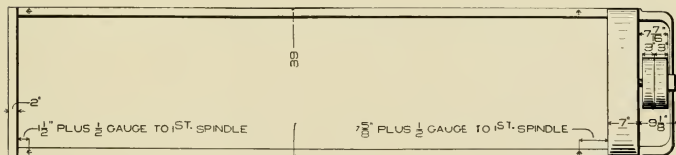
# FLOOR PLAN OF TWISTERS



**Model B, Tape Drive Spindles,  
Foot End Drive.**

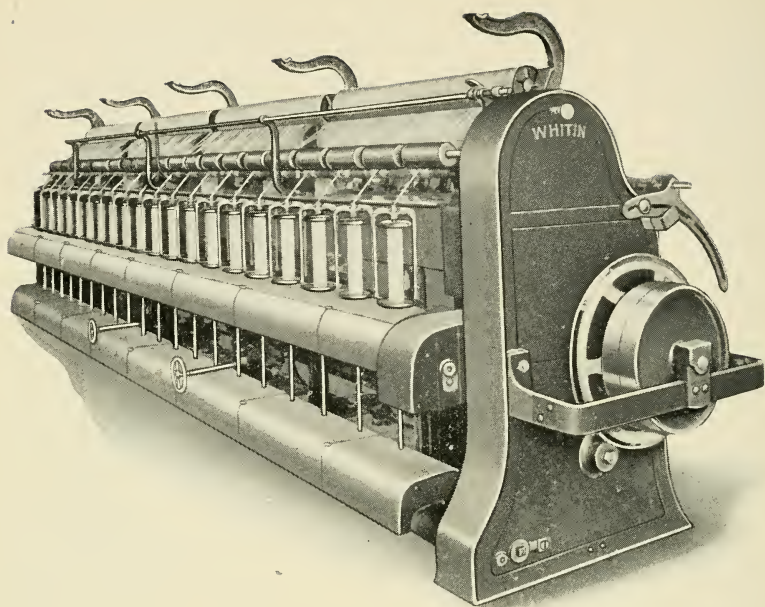


**Model A, Band Drive Spindles,  
Head End Drive.**



**Model B, Tape Drive Spindles,  
Head End Drive.**

**Rule** for finding the overall lengths of Model B frames: Number spindles  $\div 2 \times$  gauge  $\times 29 \frac{1}{4}$  = length in inches of frame with 3 inch face pulleys.



## FLYER TWISTER

The machine illustrated is designed to twist coarse yarns from roving spools made on a condenser card, but machines of this type can be made with creels for bobbins or cheeses if so ordered. The machine is built with direct-weighted or self-balanced rails as preferred. The flyers are of the best quality of polished steel, evenly balanced and free from vibration. A line of steel bottom rolls with a single line of heavy top-rolls is used.

**Weight per foot in length  
with self-balanced rails:**

**Domestic:**

Net, 291 pounds,  
Gross, 326 pounds.

**Export:**

Gross, 367 pounds,  
Cubic Feet 9.

# BAND DRIVE Twister Speed Table.

Giving Revolutions per Minute of 7 Inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 7 inch Cylinder with									
	$\frac{3}{8}$ inch Whirl Ratio 7.25	$\frac{1}{2}$ inch Whirl Ratio 6.62	1 inch Whirl Ratio 6.24	1 $\frac{1}{8}$ inch Whirl Ratio 5.86	1 $\frac{1}{4}$ inch Whirl Ratio 5.43	1 $\frac{5}{16}$ inch Whirl Ratio 4.80	1 $\frac{3}{8}$ inch Whirl Ratio 3.80	1 $\frac{1}{2}$ inch Whirl Ratio 3.70	2 inch Whirl Ratio 3.41	2 $\frac{1}{2}$ inch Whirl Ratio 2.66
3000						625	789	811	880	1128
3100						646	816	838	909	1165
3200						667	842	865	938	1203
3300						688	868	892	968	1241
3400						708	895	919	997	1278
3500					645	729	921	946	1026	1316
3600					663	750	947	973	1056	1353
3700					681	771	974	1000	1085	1391
3800					700	792	1000	1027	1114	1428
3900					718	813	1026	1054	1144	1466
4000				683	737	833	1053	1081	1173	
4100				700	755	854	1079	1108	1202	
4200				717	773	875	1105	1135	1232	
4300				734	792	896	1132	1162	1261	
4400				751	810	917	1158	1189	1290	
4500			721	768	829	938	1184	1216	1319	
4600			737	785	847	958	1211	1243	1349	
4700			753	802	866	979	1237	1270	1378	
4800			769	819	884	1000	1263	1297	1408	
4900			781	836	902	1021	1289	1324	1436	
5000		755	801	853	921	1042	1316	1351		
5100		770	817	870	939	1063	1342	1378		
5200		785	833	887	957	1083	1368	1405		
5300		801	849	904	976	1104	1395	1432		
5400		816	865	921	994	1125	1421	1459		
5500	759	831	881	938	1013	1146				
5600	772	846	897	956	1031	1167				
5700	786	861	913	973	1050	1188				
5800	800	876	929	990	1068	1208				
5900	814	891	946	1007	1087	1224				
6000	828	906	962	1024	1105	1250				
6100	841	921	978	1041	1123	1271				
6200	855	936	994	1058	1142	1292				
6300	869	952	1010	1075	1160	1313				
6400	883	967	1026	1092	1179	1333				

# BAND DRIVE

## Twister Speed Table.

Giving Revolutions per Minute of 7 Inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 7 inch Cylinder with							
	$\frac{7}{8}$ inch Whirl Ratio 7.25	$\frac{15}{16}$ inch Whirl Ratio 6.62	1 inch Whirl Ratio 6.24	$1\frac{1}{16}$ inch Whirl Ratio 5.86	$1\frac{1}{8}$ inch Whirl Ratio 5.43	$1\frac{5}{16}$ inch Whirl Ratio 4.80	$1\frac{3}{8}$ inch Whirl Ratio 3.80	$1\frac{1}{2}$ inch Whirl Ratio 3.70
6500	897	982	1042	1109	1197	1354		
6600	910	997	1058	1126	1215	1375		
6700	924	1012	1074	1143	1234	1396		
6800	938	1027	1090	1160	1252	1417		
6900	952	1042	1106	1177	1271	1438		
7000	966	1057	1122	1195	1289			
7100	979	1072	1138	1212	1308			
7200	993	1088	1154	1229	1326			
7300	1007	1103	1170	1246	1344			
7400	1021	1118	1186	1263	1363			
7500	1034	1133	1202	1280	1381			
7600	1048	1148	1218	1297	1400			
7700	1062	1163	1234	1314	1418			
7800	1076	1178	1250	1331	1436			
7900	1090	1193	1266	1348	1455			
8000	1103	1208	1282	1365				
8100	1117	1223	1298	1382				
8200	1131	1239	1314	1399				
8300	1145	1254	1330	1416				
8400	1159	1269	1346	1433				
8500	1172	1284	1362					
8600	1186	1299	1378					
8700	1200	1314	1394					
8800	1214	1329	1410					
8900	1228	1344	1426					
9000	1241	1360						
9100	1255	1375						
9200	1269	1390						
9300	1283	1405						
9400	1297	1420						
9500	1310							
9600	1324							
9700	1338							
9800	1352							
9900	1366							
10000	1379							

# BAND DRIVE Twister Speed Table.

Giving Revolutions per Minute of 8 Inch Cylinder Required to  
Produce Various Spindle Speeds.

R. P. M. OF SPINDLES	Revolutions per Minute of 8 inch Cylinder with									
	$\frac{7}{8}$ inch Whirl Ratio 8.28	$1\frac{1}{8}$ inch Whirl Ratio 7.67	1 inch Whirl Ratio 7.08	$1\frac{1}{16}$ inch Whirl Ratio 6.80	$1\frac{1}{4}$ inch Whirl Ratio 6.62	$1\frac{5}{8}$ inch Whirl Ratio 5.48	$1\frac{3}{4}$ inch Whirl Ratio 4.37	$1\frac{7}{8}$ inch Whirl Ratio 4.12	2 inch Whirl Ratio 3.88	$2\frac{1}{8}$ inch Whirl Ratio 3.03
3000						547	686	728	773	990
3100						566	709	752	799	1023
3200						584	732	776	825	1056
3300						602	755	800	851	1089
3400						620	778	825	876	1121
3500					563	639	800	849	902	1155
3600					579	657	824	874	928	1188
3700					595	675	847	898	954	1221
3800					611	693	870	922	979	1254
3900					627	712	892	947	1005	1287
4000				588	643	730	915	971	1031	1320
4100				603	659	748	938	995	1057	1353
4200				618	675	766	960	1019	1082	1386
4300				632	691	785	983	1044	1108	1419
4400				647	707	803	1007	1058	1134	1452
4500			636	662	723	821	1030	1092	1160	
4600			650	676	740	840	1053	1117	1186	
4700			664	691	756	858	1076	1141	1211	
4800			678	706	772	876	1098	1165	1237	
4900			692	721	788	894	1121	1189	1263	
5000		652	706	735	804	912	1144	1214	1289	
5100		665	720	750	820	930	1167	1238	1314	
5200		678	734	765	836	949	1190	1262	1340	
5300		691	749	779	852	967	1213	1286	1366	
5400		704	761	794	868	985	1236	1311	1392	
5500	664	717	777	809	884	1004	1259	1335		
5600	676	730	791	824	900	1022	1281	1359		
5700	688	743	805	838	916	1040	1304	1383		
58 0	700	756	819	853	932	1058	1327	1408		
5900	712	768	833	868	949	1077	1350	1432		
6000	725	782	847	882	965	1095	1373			
6100	737	795	862	897	981	1113	1396			
6200	748	808	876	912	997	1131	1419			
6300	761	821	890	926	1013	1150	1442			
6400	773	834	904	941	1029	1168	1465			

# BAND DRIVE Twister Speed Table.

Giving Revolutions per Minute of 8 Inch Cylinder Required to  
Produce Various Spindle Speeds.

R.P.M. OF SPINDLES	Revolutions per Minute of 8 inch Cylinder with							
	$\frac{5}{8}$ inch Whirl Ratio 8.28	$1\frac{1}{16}$ inch Whirl Ratio 7.67	1 inch Whirl Ratio 7.08	$1\frac{1}{8}$ inch Whirl Ratio 6.80	$1\frac{1}{4}$ inch Whirl Ratio 6.22	$1\frac{5}{16}$ inch Whirl Ratio 5.48	$1\frac{3}{8}$ inch Whirl Ratio 4.37	$1\frac{1}{2}$ inch Whirl Ratio 4.12
6500	785	847	918	956	1045	1186		
6600	797	860	932	971	1061	1205		
6700	809	874	946	985	1077	1223		
6800	821	887	961	1000	1093	1241		
6900	833	900	985	1014	1109	1259		
7000	845	913	989	1029	1125	1277		
7100	857	926	1003	1044	1141	1296		
7200	870	939	1017	1059	1158	1314		
7300	882	952	1031	1074	1172	1332		
7400	894	965	1045	1088	1190	1350		
7500	906	978	1059	1103	1206	1369		
7600	918	991	1073	1118	1222	1387		
7700	930	1004	1088	1132	1238	1405		
7800	942	1017	1102	1147	1254	1423		
7900	954	1030	1116	1162	1270	1442		
8000	966	1043	1130	1176	1286			
8100	978	1056	1144	1191	1302			
8200	990	1069	1158	1206	1318			
8300	1002	1082	1172	1221	1334			
8400	1014	1095	1186	1235	1350			
8500	1027	1108	1201	1250	1367			
8600	1039	1121	1215	1265	1383			
8700	1051	1134	1229	1279	1399			
8800	1063	1147	1243	1294	1415			
8900	1075	1160	1257	1309	1431			
9000	1087	1173	1271	1324				
9100	1099	1186	1285	1338				
9200	1111	1199	1299	1353				
9300	1123	1213	1314	1368				
9400	1135	1226	1328	1382				
9500	1147	1239	1342	1397				
9600	1159	1252	1356	1412				
9700	1171	1265	1370	1426				
9800	1183	1278	1384	1441				
9900	1195	1291	1398	1456				
10000	1208	1304	1412	1471				

# TAPE DRIVE TWISTER

## SPEED TABLE

Giving Revolutions per Minute of 7" Cylinder Required to Produce Various Spindle Speeds

R. P. M. OF SPINDLES	Revolutions per Minute of 7" Cylinder with									
	$\frac{3}{8}$ inch Whirl Ratio 7.8	$\frac{1}{2}$ inch Whirl Ratio 7.27	1 inch Whirl Ratio 6.81	$1\frac{1}{8}$ inch Whirl Ratio 6.43	$1\frac{1}{2}$ inch Whirl Ratio 6.09	$1\frac{5}{8}$ inch Whirl Ratio 5.22	$1\frac{3}{4}$ inch Whirl Ratio 4.2	$1\frac{1}{2}$ inch Whirl Ratio 3.93	2 inch Whirl Ratio 3.51	$2\frac{1}{2}$ inch Whirl Ratio 2.76
3000	...	...	...	...	...	574	714	763	853	1086
3100	...	...	...	...	...	594	738	789	883	1123
3200	...	...	...	...	...	613	762	815	912	1160
3300	...	...	...	...	...	632	785	840	940	1196
3400	...	...	...	...	...	651	809	865	98	1232
3500	...	...	...	...	575	670	833	891	996	1268
3600	...	...	...	...	592	689	857	916	1025	1304
3700	...	...	...	...	608	719	881	942	1053	1340
3800	...	...	...	...	624	728	905	967	1082	1376
3900	...	...	...	...	641	747	929	993	1111	1412
4000	...	...	...	622	657	766	952	1017	1139	
4100	...	...	...	637	674	785	976	1043	1167	
4200	...	...	...	653	690	804	1000	1069	1196	
4300	...	...	...	668	706	823	1024	1094	1225	
4400	...	...	...	684	722	842	1048	1120	1253	
4500	...	...	661	699	739	861	1072	1145	1282	
4600	...	...	676	715	756	881	1095	1171	1311	
4700	...	...	691	731	773	900	1119	1196	1339	
4800	...	...	704	746	788	919	1143	1222	1368	
4900	...	...	720	762	804	938	1167	1247	1396	
5000	...	688	735	777	821	957	1191	1272		
5100	...	701	750	792	838	976	1214	1298		
5200	...	715	765	808	854	996	1238	1323		
5300	...	729	779	824	871	1015	1262	1349		
5400	...	742	794	840	888	1034	1286	1365		
5500	705	756	809	855	904	1053	1310			
5600	718	770	824	871	920	1071	1334			
5700	731	784	838	888	937	1091	1357			
5800	743	798	852	902	953	1111	1381			
5900	756	811	867	917	970	1121	1405			
6000	769	825	882	932	986	1145	1429			
6100	782	839	897	948	1002	1164	1452			
6200	795	852	911	964	1019	1184	1476			
6300	807	866	926	980	1035	1204	1500			
6400	821	880	941	995	1052	1223	1524			



# TAPE DRIVE TWISTER

## SPEED TABLE

**Giving Revolutions per Minute of 7" Cylinder Required to Produce Various Spindle Speeds**

R. P. M. OF SPINDLES	Revolutions per Minute of 7" Cylinder with								
	$\frac{7}{8}$ inch Whirl Ratio 7.8	$1\frac{1}{16}$ inch Whirl Ratio 7.27	1 inch Whirl Ratio 6.81	$1\frac{1}{8}$ inch Whirl Ratio 6.43	$1\frac{1}{4}$ inch Whirl Ratio 6.09	$1\frac{5}{16}$ inch Whirl Ratio 5.22	$1\frac{3}{8}$ inch Whirl Ratio 4.2	$1\frac{1}{2}$ inch Whirl Ratio 3.93	2 inch Whirl Ratio 3.51
6500	833	893	955	1011	1069	1243			
6600	846	906	970	1024	1085	1262			
6700	859	921	985	1041	1100	1282			
6800	872	934	1000	1055	1117	1301			
6900	885	947	1014	1072	1134	1321			
7000	897	962	1029	1085	1150				
7100	910	975	1044	1103	1167				
7200	922	990	1058	1116	1184				
7300	935	1002	1073	1133	1200				
7400	948	1016	1088	1150	1216				
7500	961	1031	1103	1164	1233				
7600	974	1044	1117	1181	1249				
7700	987	1057	1132	1195	1266				
7800	1000	1072	1147	1212	1283				
7900	1013	1085	1162	1226	1299				
8000	1026	1100	1176	1242					
8100	1038	1113	1191	1256					
8200	1051	1126	1206	1273					
8300	1064	1141	1220	1290					
8400	1077	1154	1235	1304					
8500	1090	1167	1250						
8600	1102	1182	1264						
8700	1115	1195	1279						
8800	1128	1210	1294						
8900	1141	1223	1309						
9000	1154	1236							
9100	1167	1251							
9200	1179	1264							
9300	1192	1276							
9400	1205	1292							
9500	1218								
9600	1231								
9700	1243								
9800	1256								
9900	1269								
10000	1282								

# TAPE DRIVE TWISTER

## SPEED TABLE

**Giving Revolutions per Minute of 8" Cylinder Required to Produce Various Spindle Speeds**

R. P. M. OF SPINDLES	Revolutions per Minute of 8" Cylinder with									
	$\frac{7}{8}$ inch Whirl Ratio 8.8	$1\frac{1}{8}$ inch Whirl Ratio 8.3	1 inch Whirl Ratio 7.8	$1\frac{1}{4}$ inch Whirl Ratio 7.3	$1\frac{1}{2}$ inch Whirl Ratio 7.0	$1\frac{5}{8}$ inch Whirl Ratio 5.9	$1\frac{3}{4}$ inch Whirl Ratio 4.84	$1\frac{1}{2}$ inch Whirl Ratio 4.52	2 inch Whirl Ratio 4.00	$2\frac{1}{2}$ inch Whirl Ratio 3.2
3000	...	...	...	...	...	509	620	664	750	938
3100	...	...	...	...	...	526	641	686	775	969
3200	...	...	...	...	...	543	662	708	800	1000
3300	...	...	...	...	...	559	682	730	825	1031
3400	...	...	...	...	...	576	702	752	850	1062
3500	...	...	...	...	500	593	723	774	875	1093
3600	...	...	...	...	514	610	744	796	900	1125
3700	...	...	...	...	529	627	764	818	925	1156
3800	...	...	...	...	543	644	785	841	950	1187
3900	...	...	...	...	557	661	806	864	975	1219
4000	...	...	...	548	571	678	827	885	1000	1250
4100	...	...	...	561	586	695	847	907	1025	1282
4200	...	...	...	575	600	711	868	929	1050	1313
4300	...	...	...	589	614	728	889	951	1075	1344
4400	...	...	...	603	628	745	909	973	1100	1375
4500	...	...	577	616	643	762	930	995	1125	
4600	...	...	590	630	657	779	951	1018	1150	
4700	...	...	602	644	671	796	972	1040	1175	
4800	...	...	615	657	686	812	993	1062	1200	
4900	...	...	628	671	700	830	1013	1085	1225	
5000	...	602	641	685	714	847	1033	1107	1250	
5100	...	614	654	698	728	864	1054	1129	1275	
5200	...	627	667	712	742	881	1074	1151	1300	
5300	...	639	680	726	757	898	1095	1173	1325	
5400	...	651	692	740	771	915	1116	1196	1350	
5500	625	662	704	753	785	932	1136	1217		
5600	636	674	718	767	800	949	1157	1239		
5700	648	687	730	781	814	966	1177	1262		
5800	659	698	743	794	828	983	1198	1284		
5900	670	710	756	806	842	1000	1219	1306		
6000	682	723	769	821	857	1017	1240			
6100	693	734	782	836	871	1034	1260			
6200	704	746	794	849	885	1050	1281			
6300	716	759	808	863	900	1067	1301			
6400	728	770	820	876	914	1084	1322			

# TAPE DRIVE TWISTER

## SPEED TABLE

Giving Revolutions per Minute of 8" Cylinder Required to Produce Various  
Spindle Speeds

R. P. M OF SPINDLES	Revolutions per Minute of 8" Cylinder with									
	$\frac{1}{8}$ inch Whirl Ratio 8.8	$\frac{15}{16}$ inch Whirl Ratio 8.3	1 inch Whirl Ratio 7.8	$1\frac{1}{16}$ inch Whirl Ratio 7.3	$1\frac{1}{8}$ inch Whirl Ratio 7.0	$1\frac{5}{16}$ inch Whirl Ratio 5.9	$1\frac{3}{8}$ inch Whirl Ratio 4.84	$1\frac{1}{4}$ inch Whirl Ratio 4.52	2 inch Whirl Ratio 4.00	$2\frac{1}{4}$ inch Whirl Ratio 3.2
6500	739	783	833	890	928	1101				
6600	750	795	846	903	943	1118				
6700	761	807	859	918	957	1135				
6800	773	819	872	931	971	1152				
6900	784	831	885	945	986	1169				
7000	795	843	897	959	1000	1186				
7100	806	855	910	972	1014	1203				
7200	817	867	922	986	1028	1220				
7300	828	879	936	1000	1043	1237				
7400	841	891	949	1013	1057	1254				
7500	852	903	961	1025	1071	1271				
7600	864	916	974	1040	1085	1288				
7700	875	928	987	1054	1100	1305				
7800	886	940	1000	1066	1114	1322				
7900	898	952	1013	1082	1128	1339				
8000	908	964	1026	1096	1142					
8100	920	976	1038	1110	1157					
8200	932	988	1051	1123	1171					
8300	943	1000	1064	1137	1185					
8400	954	1012	1076	1151	1200					
8500	966	1024	1089	1164	1214					
8600	977	1036	1102	1178	1228					
8700	989	1048	1115	1192	1243					
8800	1000	1060	1128	1204	1257					
8900	1010	1072	1141	1219	1271					
9000	1022	1084	1154	1233						
9100	1034	1096	1167	1247						
9200	1045	1108	1179	1260						
9300	1057	1120	1192	1274						
9400	1068	1132	1205	1288						
9500	1079	1144	1218	1302						
9600	1091	1156	1231	1316						
9700	1102	1169	1243	1329						
9800	1114	1181	1256	1342						
9900	1125	1193	1269	1356						
10000	1136	1204	1282	1370						

## RULES FOR TWISTERS

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*To calculate the resulting counts of ply yarn, made of two strands of different sizes:*

Divide the product of the single counts by their sum.

*Example.*— $40\text{s} \times 10\text{s} = 400 \div (40 + 10) = 8\text{s}$ .

*To calculate the single count that must be combined with another single strand of known size, in order to make a two-ply of given size:*

Divide the product of the known counts by their difference.

*Example.*— $10\text{s} \times 8\text{s} = 80$ .  $80 \div (10 - 8) = 40\text{s}$ .

*To find the twist per inch of ply yarn:*

Divide the number of yarn to be twisted by the ply required. Multiply the square root of this quotient by 4, 5 or 6, according to whether soft, medium or hard twist is required.

*Example.*—What is the medium twist per inch of 12s 3-ply?

$$12 \div 3 = 4. \sqrt{4} = 2. \quad 2 \times 5 = 10 \text{ turns per inch.}$$

*To find the twist per inch in machine:*

The product of the front roll gear, the stud gear, and the ratio of the spindle to the cylinder, divided by the product of the cylinder gear, and the circumference in inches of the front roll, equals the twist constant. Twist constant divided by change gear equals twist per inch.

*Example.*—What is the twist constant with the following gearing? Front roll gear 112 teeth, stud gear 88 teeth,  $1\frac{5}{16}$ -inch whirl, 7-inch cylinder, ratio whirl to cylinder 4.80, front roll  $1\frac{1}{2}$ -inch diameter, cylinder gear 22 teeth.

$$\frac{112 \times 88 \times 2 \times 4.80}{22 \times 3 \times 3.1416} = 456.3 \text{ constant.}$$

# Twist Tables for Twisting Yarns.

## Two Ply.

No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by			No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by		
			4	5	6				4	5	6
1	.5	.7071	2.83	3.54	4.24	51	25.5	5.0498	20.20	25.25	30.30
2	1.	1.	4.	5.	6.	52	26.	5.0990	20.40	25.50	30.59
3	1.5	1.2247	4.90	6.12	7.35	53	26.5	5.1478	20.59	25.74	30.89
4	2.	1.4142	5.66	7.07	8.49	54	27.	5.1962	20.78	25.98	31.18
5	2.5	1.5811	6.32	7.91	9.49	55	27.5	5.2440	20.98	26.22	31.46
6	3.	1.7321	6.93	8.66	10.39	56	28.	5.2915	21.17	26.46	31.75
7	3.5	1.8708	7.48	9.35	11.22	57	28.5	5.3385	21.35	26.69	32.03
8	4.	2.	8.	10.	12.	58	29.	5.3852	21.54	26.93	32.31
9	4.5	2.1213	8.49	10.61	12.73	59	29.5	5.4314	21.73	27.16	32.59
10	5.	2.2361	8.94	11.18	13.42	60	30.	5.4772	21.91	27.39	32.86
11	5.5	2.3452	9.38	11.73	14.07	61	30.5	5.5227	22.09	27.61	33.14
12	6.	2.4495	9.80	12.25	14.70	62	31.	5.5678	22.27	27.84	33.41
13	6.5	2.5495	10.20	12.75	15.30	63	31.5	5.6125	22.45	28.06	33.67
14	7.	2.6458	10.58	13.23	15.87	64	32.	5.6569	22.63	28.28	33.94
15	7.5	2.7386	10.95	13.69	16.43	65	32.5	5.7009	22.80	28.50	34.21
16	8.	2.8284	11.31	14.14	16.97	66	33.	5.7446	22.98	28.72	34.47
17	8.5	2.9155	11.66	14.58	17.49	67	33.5	5.7879	23.15	28.94	34.73
18	9.	3.	12.	15.	18.	68	34.	5.8310	23.32	29.15	34.99
19	9.5	3.0822	12.33	15.41	18.49	69	34.5	5.8737	23.49	29.37	35.24
20	10.	3.1623	12.65	15.81	18.97	70	35.	5.9161	23.66	29.58	35.50
21	10.5	3.2404	12.96	16.20	19.44	71	35.5	5.9582	23.83	29.79	35.75
22	11.	3.3166	13.27	16.58	19.90	72	36.	6.	24.	30.	36.
23	11.5	3.3912	13.56	16.96	20.35	73	36.5	6.0415	24.17	30.21	36.25
24	12.	3.4641	13.86	17.32	20.78	74	37.	6.0828	24.33	30.41	36.50
25	12.5	3.5355	14.14	17.68	21.21	75	37.5	6.1237	24.49	30.62	36.74
26	13.	3.6056	14.42	18.03	21.63	76	38.	6.1644		30.82	36.99
27	13.5	3.6742	14.70	18.37	22.05	77	38.5	6.2049		31.02	37.23
28	14.	3.7417	14.97	18.71	22.45	78	39.	6.2450		31.22	37.47
29	14.5	3.8079	15.23	19.04	22.85	79	39.5	6.2849		31.42	37.71
30	15.	3.8730	15.49	19.37	23.24	80	40.	6.3246		31.62	37.95
31	15.5	3.9370	15.75	19.69	23.62	81	40.5	6.3640		31.82	38.18
32	16.	4.	16.	20.	24.	82	41.	6.4031		32.02	38.42
33	16.5	4.0620	16.25	20.31	24.37	83	41.5	6.4420		32.21	38.65
34	17.	4.1231	16.49	20.62	24.74	84	42.	6.4807		32.40	38.88
35	17.5	4.1833	16.73	20.92	25.10	85	42.5	6.5192		32.60	39.12
36	18.	4.2426	16.97	21.21	25.46	86	43.	6.5574		32.79	39.34
37	18.5	4.3012	17.20	21.51	25.81	87	43.5	6.5955		32.98	39.57
38	19.	4.3589	17.44	21.79	26.15	88	44.	6.6332		33.17	39.80
39	19.5	4.4159	17.66	22.08	26.50	89	44.5	6.6708		33.35	40.02
40	20.	4.4721	17.89	22.36	26.83	90	45.	6.7082		33.54	40.25
41	20.5	4.5277	18.11	22.64	27.17	91	45.5	6.7454		33.73	40.47
42	21.	4.5826	18.33	22.91	27.50	92	46.	6.7823		33.91	40.69
43	21.5	4.6368	18.55	23.18	27.82	93	46.5	6.8191		34.10	40.91
44	22.	4.6904	18.76	23.45	28.14	94	47.	6.8557		34.28	41.13
45	22.5	4.7434	18.97	23.72	28.46	95	47.5	6.8920		34.46	41.35
46	23.	4.7958	19.18	23.98	28.77	96	48.	6.9282		34.64	41.57
47	23.5	4.8477	19.39	24.24	29.09	97	48.5	6.9642		34.82	41.79
48	24.	4.8990	19.60	24.49	29.39	98	49.	7.		35.	42.
49	24.5	4.9497	19.80	24.75	29.70	99	49.5	7.0356		35.18	42.21
50	25.	5.	20.	25.	30.	100	50.	7.0711		35.36	42.43

# Twist Tables for Twisting Yarns.

## Three Ply.

No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by			No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by		
			4	5	6				4	5	6
1	.33	.5774	2.31	2.89	3.46	51	17.	4.1231	16.49	20.62	24.74
2	.67	.8165	3.27	4.08	4.90	52	17.33	4.1633	16.65	20.82	24.98
3	1.	1.	4.	5.	6.	53	17.67	4.2032	16.81	21.02	25.22
4	1.33	1.1547	4.62	5.77	6.93	54	18.	4.2426	16.97	21.21	25.46
5	1.67	1.2910	5.16	6.45	7.75	55	18.33	4.2817	17.13	21.41	25.69
6	2.	1.4142	5.66	7.07	8.49	56	18.67	4.3205	17.28	21.60	25.92
7	2.33	1.5275	6.11	7.64	9.17	57	19.	4.3589	17.44	21.79	26.15
8	2.67	1.6330	6.53	8.16	9.80	58	19.33	4.3970	17.59	21.98	26.38
9	3.	1.7321	6.93	8.66	10.39	59	19.67	4.4347	17.74	22.17	26.61
10	3.33	1.8257	7.30	9.13	10.95	60	20.	4.4721	17.89	22.36	26.83
11	3.67	1.9149	7.66	9.57	11.49	61	20.33	4.5092	18.04	22.55	27.06
12	4.	2.	8.	10.	12.	62	20.67	4.5461	18.18	22.73	27.28
13	4.33	2.0817	8.33	10.41	12.49	63	21.	4.5826	18.33	22.91	27.50
14	4.67	2.1602	8.64	10.80	12.96	64	21.33	4.6188	18.48	23.09	27.71
15	5.	2.2361	8.94	11.18	13.42	65	21.67	4.6547	18.62	23.27	27.93
16	5.33	2.3094	9.24	11.55	13.86	66	22.	4.6904	18.76	23.45	28.14
17	5.67	2.3805	9.52	11.90	14.28	67	22.33	4.7258	18.90	23.63	28.35
18	6.	2.4495	9.80	12.25	14.70	68	22.67	4.7610	19.04	23.80	28.57
19	6.33	2.5166	10.07	12.58	15.10	69	23.	4.7958	19.18	23.98	28.77
20	6.67	2.5820	10.33	12.91	15.49	70	23.33	4.8305	19.32	24.15	28.98
21	7.	2.6458	10.58	13.23	15.87	71	23.67	4.8648	19.46	24.32	29.19
22	7.33	2.7080	10.83	13.54	16.25	72	24.	4.8990	19.60	24.49	29.39
23	7.67	2.7689	11.08	13.84	16.61	73	24.33	4.9329	19.73	24.66	29.60
24	8.	2.8284	11.31	14.14	16.97	74	24.67	4.9666	19.87	24.83	29.80
25	8.33	2.8868	11.55	14.43	17.32	75	25.	5.	20.	25.	30.
26	8.67	2.9439	11.76	14.72	17.66	76	25.33	5.0332		25.17	30.20
27	9.	3.	12.	15.	18.	77	25.67	5.0662		25.33	30.40
28	9.33	3.0551	12.22	15.28	18.33	78	26.	5.0990		25.50	30.59
29	9.67	3.1091	12.44	15.55	18.65	79	26.33	5.1316		25.66	30.79
30	10.	3.1623	12.65	15.81	18.97	80	26.67	5.1640		25.82	30.98
31	10.33	3.2145	12.86	16.07	19.29	81	27.	5.1962		25.98	31.18
32	10.67	3.2659	13.06	16.33	19.60	82	27.33	5.2281		26.14	31.37
33	11.	3.3166	13.27	16.58	19.90	83	27.67	5.2599		26.30	31.56
34	11.33	3.3665	13.47	16.83	20.20	84	28.	5.2915		26.46	31.75
35	11.67	3.4157	13.66	17.08	20.49	85	28.33	5.3229		26.61	31.94
36	12.	3.4641	13.86	17.32	20.78	86	28.67	5.3541		26.77	32.12
37	12.33	3.5119	14.05	17.56	21.07	87	29.	5.3852		26.93	32.31
38	12.67	3.5590	14.24	17.80	21.35	88	29.33	5.4160		27.08	32.50
39	13.	3.6056	14.42	18.03	21.63	89	29.67	5.4467		27.23	32.68
40	13.33	3.6515	14.61	18.26	21.91	90	30.	5.4772		27.39	32.86
41	13.67	3.6969	14.79	18.48	22.18	91	30.33	5.5076		27.54	33.05
42	14.	3.7417	14.97	18.71	22.45	92	30.67	5.5377		27.69	33.23
43	14.33	3.7859	15.14	18.93	22.72	93	31.	5.5678		27.84	33.41
44	14.67	3.8297	15.32	19.15	22.98	94	31.33	5.5970		27.99	33.59
45	15.	3.8730	15.49	19.36	23.24	95	31.67	5.6273		28.14	33.76
46	15.33	3.9158	15.66	19.58	23.49	96	32.	5.6569		28.28	33.94
47	15.67	3.9582	15.83	19.79	23.75	97	32.33	5.6862		28.43	34.12
48	16.	4.	16.	20.	24.	98	32.67	5.7155		28.58	34.29
49	16.33	4.0415	16.17	20.21	24.25	99	33.	5.7446		28.72	34.47
50	16.67	4.0825	16.33	20.41	24.49	100	33.33	5.7735		28.87	34.64

# Twist Tables for Twisting Yarns.

## Four Ply.

No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by			No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by		
			4	5	6				4	5	6
1	.25	.5	2.	2.5	3.	51	12.75	3.5707	14.28	17.85	21.42
2	.50	.7071	2.83	3.54	4.24	52	13.	3.6056	14.42	18.03	21.63
3	.75	.8660	3.46	4.33	5.20	53	13.25	3.6401	14.56	18.20	21.84
4	1.	1.	4.	5.	6.	54	13.50	3.6742	14.70	18.37	22.05
5	1.25	1.1180	4.47	5.59	6.71	55	13.75	3.7081	14.83	18.54	22.25
6	1.50	1.2247	4.90	6.12	7.35	56	14.	3.7417	14.97	18.71	22.45
7	1.75	1.3229	5.29	6.61	7.94	57	14.25	3.7749	15.10	18.87	22.65
8	2.	1.4142	5.66	7.07	8.49	58	14.50	3.8079	15.23	19.04	22.85
9	2.25	1.5	6.	7.5	9.	59	14.75	3.8406	15.36	19.20	23.04
10	2.50	1.5811	6.32	7.91	9.49	60	15.	3.8730	15.49	19.37	23.24
11	2.75	1.6583	6.63	8.29	9.95	61	15.25	3.9051	15.62	19.53	23.43
12	3.	1.7321	6.93	8.66	10.39	62	15.50	3.9370	15.75	19.69	23.62
13	3.25	1.8028	7.21	9.01	10.82	63	15.75	3.9686	15.88	19.84	23.81
14	3.50	1.8708	7.48	9.35	11.22	64	16.	4.	16.	20.	24.
15	3.75	1.9365	7.75	9.68	11.62	65	16.25	4.0311	16.12	20.16	24.19
16	4.	2.	8.	10.	12.	66	16.50	4.0620	16.25	20.31	24.37
17	4.25	2.0616	8.25	10.31	12.37	67	16.75	4.0927	16.37	20.46	24.56
18	4.50	2.1213	8.49	10.61	12.73	68	17.	4.1231	16.49	20.62	24.74
19	4.75	2.1794	8.72	10.90	13.08	69	17.25	4.1533	16.61	20.77	24.92
20	5.	2.2361	8.94	11.18	13.42	70	17.50	4.1833	16.73	20.92	25.10
21	5.25	2.2913	9.17	11.46	13.75	71	17.75	4.2130	16.85	21.07	25.28
22	5.50	2.3452	9.38	11.73	14.07	72	18.	4.2426	16.97	21.21	25.46
23	5.75	2.3979	9.59	11.99	14.39	73	18.25	4.2720	17.09	21.36	25.63
24	6.	2.4495	9.80	12.25	14.70	74	18.50	4.3012	17.20	21.51	25.81
25	6.25	2.5	10.	12.5	15.	75	18.75	4.3301	17.32	21.65	25.98
26	6.50	2.5495	10.20	12.75	15.30	76	19.	4.3589	21.79	26.15	
27	6.75	2.5981	10.39	12.99	15.59	77	19.25	4.3875	21.94	26.32	
28	7.	2.6458	10.58	13.23	15.87	78	19.50	4.4159	22.08	26.50	
29	7.25	2.6926	10.77	13.46	16.16	79	19.75	4.4441	22.22	26.66	
30	7.50	2.7386	10.95	13.69	16.43	80	20.	4.4721	22.36	26.83	
31	7.75	2.7839	11.14	13.92	16.70	81	20.25	4.5	22.5	27.	
32	8.	2.8284	11.31	14.14	16.97	82	20.50	4.5277	22.64	27.17	
33	8.25	2.8723	11.49	14.36	17.23	83	20.75	4.5552	22.78	27.33	
34	8.50	2.9155	11.66	14.58	17.49	84	21.	4.5826	22.91	27.50	
35	8.75	2.9580	11.83	14.79	17.75	85	21.25	4.6098	23.05	27.66	
36	9.	3.	12.	15.	18.	86	21.50	4.6368	23.18	27.82	
37	9.25	3.0414	12.17	15.21	18.25	87	21.75	4.6637	23.32	27.98	
38	9.50	3.0822	12.33	15.41	18.49	88	22.	4.6904	23.45	28.14	
39	9.75	3.1225	12.49	15.61	18.73	89	22.25	4.7170	23.58	28.30	
40	10.	3.1623	12.65	15.81	18.97	90	22.50	4.7434	23.72	28.46	
41	10.25	3.2016	12.81	16.01	19.21	91	22.75	4.7697	23.85	28.62	
42	10.50	3.2404	12.96	16.20	19.44	92	23.	4.7958	23.98	28.77	
43	10.75	3.2787	13.11	16.39	19.67	93	23.25	4.8218	24.11	28.93	
44	11.	3.3166	13.27	16.58	19.90	94	23.50	4.8477	24.24	29.09	
45	11.25	3.3541	13.42	16.77	20.12	95	23.75	4.8734	24.37	29.24	
46	11.50	3.3912	13.56	16.96	20.35	96	24.	4.8990	24.49	29.39	
47	11.75	3.4278	13.71	17.14	20.57	97	24.25	4.9244	24.62	29.55	
48	12.	3.4641	13.86	17.32	20.78	98	24.50	4.9497	24.75	29.70	
49	12.25	3.5	14.	17.5	21.	99	24.75	4.9749	24.87	29.85	
50	12.50	3.5355	14.14	17.68	21.21	100	25.	5.	25.	30.	



# Twist Tables for Twisting Yarns

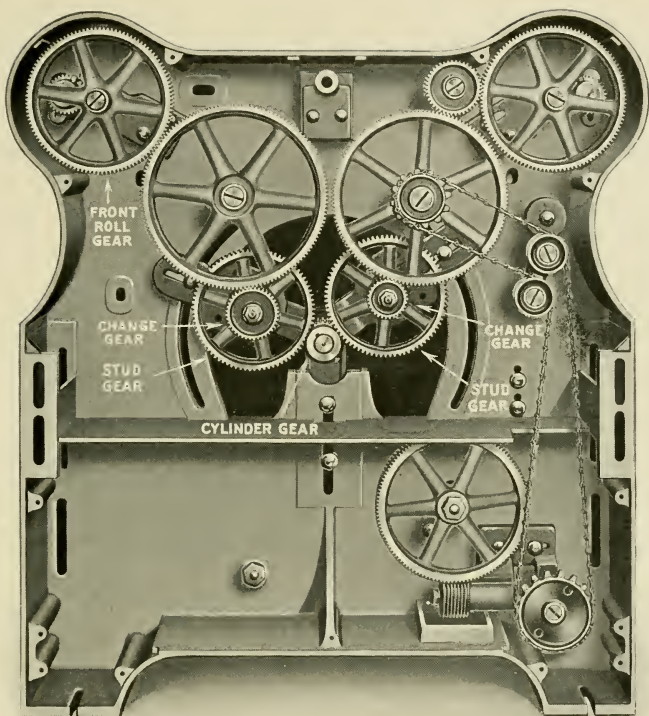
## Five Ply.

No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by			No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by		
			4	5	6				4	5	6
1	2	.4472	1.79	2.24	2.68	51	10.2	3.1937	12.77	15.97	19.16
2	4	.6325	2.53	3.16	3.79	52	10.4	3.2249	12.90	16.12	19.35
3	6	.7746	3.10	3.87	4.65	53	10.6	3.2558	13.02	16.28	19.53
4	8	.8944	3.58	4.47	5.37	54	10.8	3.2863	13.15	16.43	19.72
5	1.	1.	4.	5.	6.	55	11.	3.3166	13.27	16.58	19.90
6	1.2	1.0954	4.38	5.48	6.57	56	11.2	3.3466	13.39	16.73	20.08
7	1.4	1.1832	4.73	5.92	7.10	57	11.4	3.3764	13.51	16.88	20.26
8	1.6	1.2649	5.06	6.32	7.59	58	11.6	3.4059	13.62	17.03	20.44
9	1.8	1.3416	5.37	6.71	8.05	59	11.8	3.4351	13.74	17.18	20.61
10	2.	1.4142	5.66	7.07	8.49	60	12.	3.4641	13.86	17.32	20.78
11	2.2	1.4832	5.93	7.42	8.90	61	12.2	3.4928	13.97	17.46	20.96
12	2.4	1.5492	6.20	7.75	9.30	62	12.4	3.5214	14.09	17.61	21.13
13	2.6	1.6125	6.45	8.06	9.67	63	12.6	3.5496	14.20	17.75	21.30
14	2.8	1.6733	6.69	8.37	10.04	64	12.8	3.5777	14.31	17.89	21.47
15	3.	1.7321	6.93	8.66	10.39	65	13.	3.6056	14.42	18.03	21.63
16	3.2	1.7889	7.16	8.95	10.73	66	13.2	3.6332	14.53	18.17	21.80
17	3.4	1.8439	7.38	9.22	11.06	67	13.4	3.6606	14.64	18.30	21.96
18	3.6	1.8974	7.59	9.49	11.38	68	13.6	3.6878	14.75	18.44	22.13
19	3.8	1.9494	7.80	9.75	11.70	69	13.8	3.7148	14.86	18.56	22.29
20	4.	2.	8.	10.	12.	70	14.	3.7417	14.97	18.71	22.45
21	4.2	2.0494	8.20	10.25	12.30	71	14.2	3.6783	15.07	18.84	22.61
22	4.4	2.0976	8.39	10.49	12.59	72	14.4	3.7948	15.18	18.97	22.77
23	4.6	2.1448	8.58	10.72	12.87	73	14.6	3.8210	15.28	19.10	22.93
24	4.8	2.1909	8.76	10.95	13.15	74	14.8	3.8471	15.38	19.24	23.08
25	5.	2.2361	8.94	11.18	13.42	75	15.	3.8730	15.49	19.37	23.24
26	5.2	2.2804	9.12	11.40	13.68	76	15.2	3.8987		19.49	23.39
27	5.4	2.3238	9.30	11.62	13.94	77	15.4	3.9243		19.62	23.55
28	5.6	2.3664	9.47	11.83	14.20	78	15.6	3.9497		19.75	23.70
29	5.8	2.4083	9.63	12.04	14.45	79	15.8	3.9749		19.87	23.85
30	6.	2.4495	9.80	12.25	14.70	80	16.	4.		20.	24.
31	6.2	2.4900	9.96	12.45	14.94	81	16.2	4.0249		20.12	24.15
32	6.4	2.5298	10.12	12.65	15.18	82	16.4	4.0497		20.25	24.30
33	6.6	2.5690	10.28	12.85	15.41	83	16.6	4.0743		20.37	24.45
34	6.8	2.6077	10.43	13.04	15.65	84	16.8	4.0988		20.49	24.59
35	7.	2.6458	10.58	13.23	15.87	85	17.	4.1231		20.62	24.74
36	7.2	2.6833	10.73	13.42	16.10	86	17.2	4.1473		20.74	24.88
37	7.4	2.7203	10.88	13.60	16.32	87	17.4	4.1713		20.86	25.03
38	7.6	2.7568	11.03	13.78	16.54	88	17.6	4.1952		20.98	25.17
39	7.8	2.7928	11.17	13.96	16.76	89	17.8	4.2190		21.10	25.31
40	8.	2.8284	11.31	14.14	16.97	90	18.	4.2426		21.21	25.46
41	8.2	2.8636	11.45	14.32	17.18	91	18.2	4.2661		21.33	25.60
42	8.4	2.8983	11.59	14.49	17.39	92	18.4	4.2895		21.45	25.74
43	8.6	2.9326	11.73	14.66	17.60	93	18.6	4.3128		21.56	25.88
44	8.8	2.9665	11.87	14.83	17.80	94	18.8	4.3359		21.68	26.02
45	9.	3.	12.	15.	18.	95	19.	4.3589		21.79	26.15
46	9.2	3.0332	12.13	15.17	18.20	96	19.2	4.3818		21.91	26.29
47	9.4	3.0659	12.26	15.33	18.40	97	19.4	4.4045		22.02	26.43
48	9.6	3.0984	12.39	15.49	18.59	98	19.6	4.4272		22.14	26.50
49	9.8	3.1305	12.52	15.65	18.78	99	19.8	4.4497		22.25	26.70
50	10.	3.1623	12.65	15.81	18.97	100	20.	4.4721		22.36	26.83

# Twist Tables for Twisting Yarns.

## Six Ply.

No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by			No. of Yarn to be Twisted.	No. of Twisted Yarn.	Sq. root of No. Twisted Yarn.	Square root multiplied by		
			4	5	6				4	5	6
1	.17	.4082	1.63	2.04	2.45	51	8.50	2.9155	11.66	14.58	17.49
2	.33	.5774	2.31	2.89	3.46	52	8.67	2.9439	11.78	14.72	17.66
3	.50	.7071	2.83	3.54	4.24	53	8.83	2.9721	11.89	14.86	17.83
4	.67	.8165	3.27	4.08	4.90	54	9.	3.	12.	15.	18.
5	.83	.9129	3.65	4.56	5.48	55	9.17	3.0277	12.11	15.14	18.17
6	1.	1.	4.	5.	6.	56	9.33	3.0551	12.22	15.28	18.33
7	1.17	1.0801	4.32	5.40	6.48	57	9.50	3.0822	12.33	15.41	18.49
8	1.33	1.1547	4.62	5.77	6.93	58	9.67	3.1091	12.44	15.55	18.65
9	1.50	1.2247	4.90	6.12	7.35	59	9.83	3.1358	12.54	15.68	18.81
10	1.67	1.2910	5.16	6.45	7.75	60	10.	3.1623	12.65	15.81	18.97
11	1.83	1.3540	5.42	6.77	8.12	61	10.17	3.1885	12.75	15.94	19.13
12	2.	1.4142	5.66	7.07	8.49	62	10.33	3.2115	12.86	16.07	19.29
13	2.17	1.4720	5.89	7.36	8.83	63	10.50	3.2404	12.96	16.20	19.44
14	2.33	1.5275	6.11	7.64	9.17	64	10.67	3.2659	13.06	16.33	19.60
15	2.50	1.5811	6.32	7.91	9.49	65	10.83	3.2914	13.17	16.46	19.75
16	2.67	1.6330	6.53	8.16	9.80	66	11.	3.3166	13.27	16.58	19.90
17	2.83	1.6833	6.73	8.42	10.10	67	11.17	3.3417	13.37	16.71	20.05
18	3.	1.7321	6.93	8.66	10.39	68	11.33	3.3665	13.47	16.83	20.20
19	3.17	1.7795	7.12	8.90	10.68	69	11.50	3.3912	13.56	16.96	20.35
20	3.33	1.8257	7.30	9.13	10.95	70	11.67	3.4157	13.66	17.08	20.49
21	3.50	1.8708	7.48	9.35	11.22	71	11.83	3.4400	13.76	17.20	20.64
22	3.67	1.9149	7.66	9.57	11.49	72	12.	3.4641	13.86	17.32	20.78
23	3.83	1.9579	7.83	9.79	11.75	73	12.17	3.4881	13.95	17.44	20.93
24	4.	2.	8.	10.	12.	74	12.33	3.5119	14.05	17.56	21.07
25	4.17	2.0412	8.16	10.21	12.25	75	12.50	3.5355	14.14	17.68	21.21
26	4.33	2.0817	8.33	10.41	12.49	76	12.67	3.5590		17.80	21.35
27	4.50	2.1213	8.49	10.61	12.73	77	12.83	3.5824		17.91	21.49
28	4.67	2.1602	8.64	10.80	12.96	78	13.	3.6056		18.03	21.63
29	4.83	2.1985	8.79	10.99	13.19	79	13.17	3.6286		18.14	21.77
30	5.	2.2361	8.94	11.18	13.42	80	13.33	3.6515		18.26	21.91
31	5.17	2.2730	9.09	11.37	13.64	81	13.50	3.6742		18.37	22.05
32	5.33	2.3094	9.24	11.55	13.86	82	13.67	3.6969		18.48	22.18
33	5.50	2.3452	9.38	11.73	14.07	83	13.83	3.7192		18.60	22.32
34	5.67	2.3805	9.52	11.90	14.28	84	14.	3.7417		18.71	22.45
35	5.83	2.4152	9.66	12.08	14.49	85	14.17	3.7639		18.82	22.58
36	6.	2.4495	9.80	12.25	14.70	86	14.33	3.7859		18.93	22.72
37	6.17	2.4833	9.93	12.42	14.90	87	14.50	3.8079		19.04	22.85
38	6.33	2.5166	10.07	12.58	15.10	88	14.67	3.8297		19.15	22.98
39	6.50	2.5495	10.20	12.75	15.30	89	14.83	3.8514		19.26	23.11
40	6.67	2.5820	10.53	12.91	15.49	90	15.	3.8730		19.36	23.24
41	6.83	2.6141	10.46	13.07	15.68	91	15.17	3.8944		19.47	23.37
42	7.	2.6458	10.58	13.23	15.87	92	15.33	3.9158		19.58	23.49
43	7.17	2.6771	10.71	13.39	16.06	93	15.50	3.9370		19.69	23.62
44	7.33	2.7080	10.83	13.54	16.25	94	15.67	3.9582		19.79	23.75
45	7.50	2.7386	10.95	13.69	16.43	95	15.83	3.9791		19.90	23.87
46	7.67	2.7689	11.08	13.84	16.61	96	16.	4.		20.	24.
47	7.83	2.7988	11.20	13.99	16.79	97	16.17	4.0208		20.10	24.12
48	8.	2.8284	11.31	14.14	16.97	98	16.33	4.0415		20.21	24.25
49	8.17	2.8577	11.43	14.29	17.15	99	16.50	4.0620		20.31	24.37
50	8.33	2.8868	11.55	14.43	17.32	100	16.67	4.0825		20.41	24.49



**Band Drive Twisting Frame Twist Gearing.**

*Formula for figuring twist:*

C = Cylinder Gear.

S = Stud Gear.

T = Change Gear.

F = Front Roll Gear.

R = Ratio Whirl to Cylinder.

D = Circumference of Front Roll.

$$\frac{F \times S \times R}{T \times C \times D} = \text{Twist per inch}$$

$$\frac{F \times S \times R}{C \times D} = \text{Twist Constant.}$$

$$\frac{\text{Twist Constant}}{\text{Change Gear}} = \text{Twist per inch.}$$

$$\frac{\text{Twist Constant}}{\text{Twist per inch.}} = \text{Twist Gear.}$$

# BAND DRIVE

## Twist Gearing Constants for Whitin Twisting Frame.

7 inch Cylinder.

Front Roll 1½ in. Dia. Front Roll Gear 108 T.											
Diameter of Whirl	Ratio Whirl to Cylinder	Cyl. 20 T	Stud 100 T	Cyl. 20 T	Stud 90 T	Cyl. 20 T	Stud 80 T	Cyl. 22 T	Stud 88 T	Cyl. 36 T	Stud 74 T
		Const	Const	Const	Const	Const	Const	Const	Const	Const	Const
¾ in.	7.25			815.35		724.76		372.44		181.19	
1 1/16 in.	6.62			744.50		631.78		340.08		165.44	
1 1/8 in.	6.24			701.77		623.79		320.56		155.95	
1 1/16 in.	5.86			659.03		585.80		301.04		146.45	
1 1/8 in.	5.43			610.67		542.82		278.95		135.70	
1 1/16 in.	4.80			539.82		479.84		246.58		119.96	
1 1/8 in.	3.80			427.36		379.87		195.21		94.96	
1 1/16 in.	3.41			416.11		369.88		190.08		92.47	
2 in.	3.41			383.50		340.89		175.17		85.22	
2 1/8 in.	2.66			279.15		260.91		136.65		66.48	

8 inch Cylinder

Front Roll 1½ in. Dia. Front Roll Gear 108 T.											
Diameter of Whirl	Ratio Whirl to Cylinder	Cyl. 20 T	Stud 120 T	Cyl. 20 T	Stud 100 T	Cyl. 20 T	Stud 90 T	Cyl. 20 T	Stud 80 T	Cyl. 22 T	Stud 88 T
		Const	Const	Const	Const	Const	Const	Const	Const	Const	Const
¾ in.	8.25			931.19		827.72		425.35		206.93	
1 1/16 in.	7.67			862.59		766.74		394.02		191.68	
1 1/8 in.	7.08			796.23		707.77		363.71		176.94	
1 1/16 in.	6.80			764.74		679.77		349.33		169.94	
1 1/8 in.	6.22			699.51		621.79		319.33		155.44	
1 1/16 in.	5.48			616.29		547.82		281.52		136.95	
1 1/8 in.	4.37			491.46		436.85		224.49		109.21	
1 1/16 in.	4.12			463.34		411.86		211.65		102.96	
2 in.	3.88			436.35		387.87		199.32		96.96	
2 1/8 in.	3.03			340.76		302.89		155.65		75.72	

Front Roll 1½ in. Dia.

Front Roll Gear 112 T.

Diameter of Whirl	Ratio Whirl to Cylinder	Cyl. 20 T	Stud 120 T	Cyl. 20 T	Stud 100 T	Cyl. 20 T	Stud 90 T	Cyl. 20 T	Stud 80 T	Cyl. 22 T	Stud 88 T
		Const	Const	Const	Const	Const	Const	Const	Const	Const	Const
¾ in.	8.25			885.20		787.17		404.35		196.71	
1 1/16 in.	7.67			819.99		729.17		374.56		182.22	
1 1/8 in.	7.08			756.91		673.08		345.71		168.20	
1 1/16 in.	6.80			726.98		646.46		332.08		161.55	
1 1/8 in.	6.22			664.97		591.33		303.75		147.77	
1 1/16 in.	5.48			585.86		520.97		276.61		130.19	
1 1/8 in.	4.37			467.19		416.04		213.41		103.82	
1 1/16 in.	4.12			440.46		391.68		201.20		97.88	
2 in.	3.88			414.81		368.87		189.48		92.18	
2 1/8 in.	3.03			323.93		288.06		147.98		71.99	

Front Roll 1½ in. Dia.

Front Roll Gear 112 T.

Diameter of Whirl	Ratio Whirl to Cylinder	Cyl. 20 T	Stud 120 T	Cyl. 20 T	Stud 100 T	Cyl. 20 T	Stud 90 T	Cyl. 20 T	Stud 80 T	Cyl. 22 T	Stud 88 T
		Const	Const	Const	Const	Const	Const	Const	Const	Const	Const
¾ in.	8.25			885.20		787.17		404.35		196.71	
1 1/16 in.	7.67			819.99		729.17		374.56		182.22	
1 1/8 in.	7.08			756.91		673.08		345.71		168.20	
1 1/16 in.	6.80			726.98		646.46		332.08		161.55	
1 1/8 in.	6.22			664.97		591.33		303.75		147.77	
1 1/16 in.	5.48			585.86		520.97		276.61		130.19	
1 1/8 in.	4.37			467.19		416.04		213.41		103.82	
1 1/16 in.	4.12			440.46		391.68		201.20		97.88	
2 in.	3.88			414.81		368.87		189.48		92.18	
2 1/8 in.	3.03			323.93		288.06		147.98		71.99	

Rule to find Change Gear.— Divide Constant by Twist per inch Required.

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  Inch Diameter.**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.25  
 Whirl  $\frac{7}{8}$  inch Diameter.      Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			49.23	65T	10.60	13.25	15.90
22			46.99	66	10.44	13.05	15.66
23			44.95	67	10.29	12.86	15.43
24		35.90	43.07	68	10.14	12.67	15.20
25		34.46	41.35	69	9.99	12.49	14.98
26		33.44	39.76	70	9.85	12.31	14.77
27		31.91	38.29	71	9.71	12.13	14.56
28		30.77	36.92	72	9.57	11.97	14.36
29		29.71	35.65	73	9.44	11.80	
30		28.72	34.46	74	9.31	11.64	
31		27.79	33.35	75	9.19	11.49	
32		26.92	32.31	76	9.07	11.34	
33		26.11	31.33	77	8.94	11.19	
34		25.34	30.40	78	8.84	11.04	
35		24.62	29.54	79	8.72	10.90	
36		23.93	28.72	80	8.61	10.77	
37		23.28	27.94	81	8.51	10.64	
38		22.67	27.21	82	8.40	10.51	
39		22.09	26.51	83	8.30	10.38	
40		21.54	25.85	84	8.20	10.26	
41		21.01	25.22	85	8.11	10.14	
42		20.51	24.61	86	8.01	10.02	
43		20.04	24.04	87	7.92	9.90	
44		19.58	23.50	88	7.83	9.79	
45	15.31	19.14	22.97	89	7.74	9.68	
46	14.98	18.73	22.47	90	7.66	9.57	
47	14.66	18.33	22.00	91	7.57	9.47	
48	14.36	17.95	21.54	92	7.49	9.36	
49	14.07	17.58	21.10	93	7.41	9.26	
50	13.78	17.23	20.68	94		9.16	
51	13.51	16.89	20.27	95		9.07	
52	13.25	16.57	19.88	96		8.97	
53	13.00	16.26	19.51				
54	12.76	15.95	19.14				
55	12.53	15.66	18.80				
56	12.30	15.38	18.46				
57	12.09	15.11	18.14				
58	11.88	14.85	17.82				
59	11.68	14.60	17.52				
60	11.49	14.36	17.23				
61	11.30	14.12	16.95				
62	11.12	13.89	16.67				
63	10.94	13.67	16.41				
64	10.77	13.46	16.15				
Const's	689.24	861.56	1033.87	Const's	689.24	861.56	1033.87

# BAND DRIVE

## Twister Twist Gear Table

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter**

Cylinder 7 inches diameter.      Ratio Cylinder to Whirl 1 to 6.62

Whirl  $\frac{15}{16}$  inch diameter.      Front Roll Gear 112 teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			44.95	65T	9.68	12.10	14.52
22			42.91	66	9.53	11.92	14.30
23			41.04	67	9.39	11.74	14.09
24		32.78	39.33	68	9.25	11.57	13.88
25		31.47	37.76	69	9.12	11.40	13.68
26		30.26	36.31	70	8.99	11.24	13.49
27		29.14	34.96	71	8.86	11.08	13.30
28		28.10	33.71	72	8.74	10.93	13.11
29		27.13	32.55	73	8.62	10.78	
30		26.22	31.47	74	8.50	10.63	
31		25.38	30.45	75	8.39	10.49	
32		24.58	29.50	76	8.28	10.35	
33		23.84	28.61	77	8.17	10.22	
34		23.14	27.76	78	8.07	10.08	
35		22.48	26.97	79	7.97	9.96	
36		21.85	26.22	80	7.87	9.83	
37		21.26	25.51	81	7.77	9.71	
38		20.70	24.84	82	7.67	9.59	
39		20.17	24.20	83	7.58	9.48	
40		19.66	23.60	84	7.49	9.36	
41		19.19	23.02	85	7.40	9.25	
42		18.73	22.48	86	7.32	9.15	
43		18.29	21.95	87	7.23	9.04	
44		17.88	21.45	88	7.15	8.94	
45	13.98	17.48	20.98	89	7.07	8.84	
46	13.68	17.10	20.52	90	6.99	8.74	
47	13.39	16.74	20.08	91	6.91	8.64	
48	13.11	16.39	19.67	92	6.84	8.55	
49	12.84	16.05	19.26	93	6.76	8.46	
50	12.59	15.73	18.88	94		8.37	
51	12.34	15.42	18.51	95		8.28	
52	12.10	15.13	18.15	96		8.19	
53	11.87	14.84	17.81				
54	11.65	14.57	17.48				
55	11.44	14.30	17.16				
56	11.24	14.05	16.86				
57	11.04	13.80	16.56				
58	10.85	13.56	16.28				
59	10.67	13.33	16.00				
60	10.49	13.11	15.73				
61	10.32	12.90	15.47				
62	10.15	12.69	15.23				
63	9.99	12.49	14.98				
64	9.83	12.29	14.75				
Const's	629.35	786.69	944.03	Const's	629.35	786.69	944.03



# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter**

Cylinder 7 inches Diameter.      Ratio Cylinder to Whirl 1 to 6.24

Whirl 1 inch Diameter.      Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			42.37	65T	9.13	11.71	13.69
22			40.45	66	8.99	11.53	13.48
23			38.69	67	8.85	11.36	13.28
24		31.70	37.07	68	8.72	11.19	13.08
25		30.44	35.59	69	8.60	11.03	12.89
26		29.26	34.23	70	8.47	10.87	12.71
27		28.18	32.96	71	8.35	10.72	12.53
28		27.17	31.78	72	8.24	10.57	12.36
29		26.24	30.68	73	8.13	10.42	
30		25.36	29.66	74	8.02	10.28	
31		24.54	28.70	75	7.91	10.14	
32		23.78	27.81	76	7.80	10.01	
33		23.06	26.96	77	7.70	9.88	
34		22.38	26.17	78	7.60	9.75	
35		21.74	25.42	79	7.51	9.63	
36		21.14	24.72	80	7.41	9.51	
37		20.56	24.05	81	7.32	9.39	
38		20.02	23.42	82	7.23	9.28	
39		19.51	22.81	83	7.15	9.17	
40		19.02	22.24	84	7.06	9.06	
41		18.56	21.70	85	6.98	8.95	
42		18.12	21.18	86	6.90	8.85	
43		17.69	20.69	87	6.82	8.75	
44		17.29	20.22	88	6.74	8.65	
45	13.18	16.91	19.77	89	6.66	8.55	
46	12.90	16.54	19.34	90	6.59	8.45	
47	12.62	16.19	18.93	91	6.52	8.36	
48	12.36	15.85	18.54	92	6.45	8.27	
49	12.11	15.53	18.16	93	6.38	8.18	
50	11.86	15.22	17.79	94		8.09	
51	11.63	14.92	17.45	95		8.01	
52	11.41	14.63	17.11	96		7.93	
53	11.19	14.36	16.79				
54	10.98	14.09	16.48				
55	10.78	13.83	16.17				
56	10.59	13.59	15.89				
57	10.41	13.35	15.61				
58	10.23	13.12	15.34				
59	10.05	12.90	15.08				
60	9.89	12.68	14.83				
61	9.72	12.47	14.58				
62	9.57	12.27	14.35				
63	9.42	12.08	14.12				
64	9.27	11.89	13.90				
Const's	593.23	760.91	889.84	Const's	593.23	760.91	889.84



# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 5.86.

Whirl 1  $\frac{1}{16}$  inch Diameter.

Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			39.79	65T	8.57	10.71	12.86
22			37.98	66	8.44	10.55	12.66
23			36.33	67	8.31	10.39	12.47
24		29.01	34.82	68	8.19	10.24	12.29
25		27.85	33.43	69	8.07	10.09	12.11
26		26.78	32.14	70	7.96	9.95	11.94
27		25.79	30.95	71	7.85	9.81	11.77
28		24.87	29.84	72	7.74	9.67	11.61
29		24.01	28.82	73	7.63	9.54	
30		23.21	27.85	74	7.53	9.41	
31		22.46	26.96	75	7.43	9.29	
32		21.76	26.11	76	7.33	9.16	
33		21.10	25.32	77	7.23	9.04	
34		20.48	24.58	78	7.14	8.93	
35		19.89	23.88	79	7.05	8.81	
36		19.34	23.21	80	6.96	8.70	
37		18.82	22.58	81	6.88	8.60	
38		18.32	21.99	82	6.79	8.49	
39		17.85	21.43	83	6.71	8.39	
40		17.41	20.89	84	6.63	8.29	
41		16.98	20.38	85	6.55	8.19	
42		16.58	19.89	86	6.48	8.10	
43		16.19	19.43	87	6.40	8.00	
44		15.83	18.99	88	6.33	7.91	
45	12.38	15.47	18.57	89	6.26	7.82	
46	12.11	15.13	18.17	90	6.19	7.74	
47	11.85	14.82	17.78	91	6.12	7.65	
48	11.61	14.51	17.41	92	6.05	7.57	
49	11.37	14.21	17.05	93	5.99	7.49	
50	11.14	13.93	16.71	94		7.41	
51	10.92	13.65	16.38	95		7.33	
52	10.71	13.39	16.07	96		7.25	
53	10.51	13.14	15.77				
54	10.31	12.90	15.47				
55	10.13	12.66	15.19				
56	9.95	12.43	14.92				
57	9.77	12.22	14.66				
58	9.61	12.01	14.41				
59	9.44	11.80	14.16				
60	9.28	11.61	13.93				
61	9.13	11.42	13.70				
62	8.98	11.23	13.48				
63	8.84	11.05	13.26				
64	8.70	10.88	13.06				
Const's	557.10	696.37	835.65	Const's	557.10	696.37	835.65

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter

Ratio Cylinder to Whirl 1 to 5.43.

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 112 Teeth.

Change	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
Gears	Twist	Twist	Twist	Gears	Twist	Twist	Twist
21T			36.87	65T	7.94	9.93	11.91
22			35.20	66	7.82	9.78	11.73
23			33.67	67	7.70	9.63	11.56
24		26.89	32.26	68	7.59	9.49	11.39
25		25.81	30.97	69	7.48	9.35	11.22
26		24.82	29.78	70	7.37	9.22	11.06
27		23.90	28.68	71	7.27	9.09	10.91
28		23.05	27.65	72	7.17	8.96	10.75
29		22.25	26.70	73	7.07	8.84	
30		21.51	25.81	74	6.98	8.72	
31		20.82	24.98	75	6.88	8.61	
32		20.17	24.19	76	6.79	8.49	
33		19.55	23.46	77	6.70	8.38	
34		18.98	22.77	78	6.62	8.27	
35		18.44	22.12	79	6.53	8.17	
36		17.92	21.51	80	6.45	8.07	
37		17.44	20.93	81	6.37	7.97	
38		16.98	20.38	82	6.30	7.87	
39		16.55	19.85	83	6.22	7.77	
40		16.13	19.36	84	6.15	7.68	
41		15.74	18.89	85	6.07	7.59	
42		15.36	18.44	86	6.00	7.50	
43		15.01	18.01	87	5.93	7.42	
44		14.67	17.60	88	5.87	7.33	
45	11.47	14.34	17.21	89	5.80	7.25	
46	11.22	14.03	16.83	90	5.74	7.17	
47	10.98	13.73	16.47	91	5.67	7.09	
48	10.75	13.44	16.13	92	5.61	7.01	
49	10.53	13.17	15.80	93	5.55	6.94	
50	10.33	12.91	15.49	94		6.86	
51	10.12	12.65	15.18	95		6.79	
52	9.93	12.41	14.89	96		6.72	
53	9.74	12.18	14.61				
54	9.56	11.95	14.34				
55	9.39	11.73	14.08				
56	9.22	11.52	13.83				
57	9.06	11.32	13.58				
58	8.90	11.13	13.35				
59	8.75	10.94	13.12				
60	8.60	10.75	12.91				
61	8.46	10.58	12.69				
62	8.33	10.41	12.49				
63	8.19	10.24	12.29				
64	8.07	10.08	12.10				
Const's	516.22	645.28	774.33	Const's	516.22	645.28	774.33

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter.      Ratio Cylinder to Whirl 1 to 4.80.

Whirl 1  $\frac{5}{16}$  inch Diameter.      Front Roll Gear 112 Teeth.

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			32.59	65T	7.02	8.78	10.53
22			31.11	66	6.91	8.64	10.37
23			29.76	67	6.81	8.51	10.22
24		23.77	28.52	68	6.71	8.39	10.07
25		22.82	27.38	69	6.61	8.27	9.92
26		21.94	26.32	70	6.52	8.15	9.78
27		21.13	25.35	71	6.43	8.03	9.64
28		20.37	24.45	72	6.34	7.92	9.51
29		19.67	23.60	73	6.25	7.81	
30		19.01	22.82	74	6.17	7.71	
31		18.40	22.08	75	6.08	7.61	
32		17.83	21.39	76	6.00	7.51	
33		17.29	20.74	77	5.93	7.41	
34		16.78	20.13	78	5.85	7.31	
35		16.30	19.56	79	5.78	7.22	
36		15.84	19.01	80	5.70	7.13	
37		15.42	18.50	81	5.63	7.04	
38		15.01	18.01	82	5.57	6.96	
39		14.62	17.55	83	5.50	6.87	
40		14.26	17.11	84	5.43	6.79	
41		13.91	16.69	85	5.37	6.71	
42		13.58	16.30	86	5.31	6.63	
43		13.27	15.92	87	5.25	6.56	
44		12.96	15.56	88	5.19	6.48	
45	10.14	12.68	15.21	89	5.13	6.41	
46	9.92	12.40	14.88	90	5.07	6.34	
47	9.71	12.14	14.56	91	5.01	6.27	
48	9.51	11.88	14.26	92	4.96	6.20	
49	9.31	11.64	13.97	93	4.91	6.13	
50	9.13	11.41	13.69	94		6.07	
51	8.95	11.18	13.42	95		6.00	
52	8.78	10.97	13.16	96		5.94	
53	8.61	10.76	12.91				
54	8.45	10.56	12.68				
55	8.30	10.37	12.45				
56	8.15	10.19	12.22				
57	8.01	10.01	12.01				
58	7.87	9.83	11.80				
59	7.73	9.66	11.60				
60	7.61	9.51	11.41				
61	7.48	9.35	11.22				
62	7.36	9.20	11.04				
63	7.24	9.05	10.86				
64	7.13	8.91	10.70				
Const's	456.33	570.41	684.49	Const's	456.33	570.41	684.49

# STANDARD Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter.

Ratio Cylinder to Whirl 1 to 3.80.

Whirl  $1\frac{5}{8}$  inch Diameter.

Front Roll Gear 112 Teeth.

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			25.80	65T	5.57	6.95	8.34
22			24.63	66	5.48	6.84	8.21
23			23.56	67	5.40	6.74	8.09
24		18.82	22.58	68	5.32	6.64	7.97
25		18.06	21.68	69	5.24	6.54	7.85
26		17.37	20.84	70	5.17	6.45	7.74
27		16.72	20.07	71	5.10	6.36	7.63
28		16.13	19.35	72	5.03	6.27	7.53
29		15.57	18.69	73	4.96	6.19	
30		15.05	18.06	74	4.89	6.10	
31		14.57	17.48	75	4.82	6.02	
32		14.11	16.93	76	4.76	5.94	
33		13.68	16.42	77	4.70	5.86	
34		13.28	15.94	78	4.64	5.79	
35		12.90	15.48	79	4.58	5.72	
36		12.54	15.05	80	4.52	5.64	
37		12.20	14.65	81	4.47	5.57	
38		11.88	14.26	82	4.41	5.51	
39		11.58	13.89	83	4.36	5.44	
40		11.29	13.55	84	4.31	5.38	
41		11.01	13.22	85	4.26	5.31	
42		10.75	12.90	86	4.21	5.25	
43		10.50	12.60	87	4.16	5.19	
44		10.26	12.32	88	4.11	5.13	
45	8.04	10.03	12.04	89	4.07	5.07	
46	7.87	9.82	11.78	90	4.02	5.02	
47	7.70	9.61	11.53	91	3.98	4.96	
48	7.54	9.41	11.29	92	3.93	4.91	
49	7.38	9.22	11.06	93	3.89	4.86	
50	7.24	9.03	10.84	94		4.80	
51	7.10	8.85	10.63	95		4.75	
52	6.96	8.68	10.42	96		4.70	
53	6.83	8.52	10.22				
54	6.70	8.36	10.04				
55	6.58	8.21	9.85				
56	6.46	8.06	9.68				
57	6.35	7.92	9.51				
58	6.24	7.79	9.34				
59	6.13	7.65	9.18				
60	6.03	7.52	9.03				
61		5.93	7.40				
62		5.84	7.28				
63		5.74	7.17				
64		5.65	7.05				
Const's	361.85	451.57	541.89	Const's	361.85	451.57	541.89

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter.      Ratio Cylinder to Whirl 1 to 3.70.

Whirl  $1\frac{3}{4}$  inch Diameter.      Front Roll Gear 112 Teeth.

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T	Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T
Gears	Stud 80 T	Stud 100 T	Stud 120 T	Gears	Stud 80 T	Stud 100 T	Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			25.13	65T	5.41	6.76	8.12
22			23.98	66	5.33	6.66	7.99
23			22.94	67	5.25	6.56	7.88
24		18.32	21.98	68	5.17	6.47	7.76
25		17.59	21.12	69	5.10	6.37	7.65
26		16.91	20.29	70	5.03	6.28	7.54
27		16.28	19.54	71	4.95	6.11	7.43
28		15.70	18.84	72	4.89	6.11	7.33
29		15.16	18.19	73	4.82	6.02	
30		14.66	17.59	74	4.75	5.94	
31		14.18	17.02	75	4.69	5.86	
32		13.74	16.49	76	4.63	5.79	
33		13.32	15.99	77	4.57	5.71	
34		12.93	15.52	78	4.51	5.64	
35		12.56	15.08	79	4.45	5.57	
36		12.21	14.66	80	4.40	5.50	
37		11.88	14.26	81	4.34	5.43	
38		11.57	13.89	82	4.29	5.36	
39		11.27	13.53	83	4.24	5.30	
40		10.98	13.19	84	4.19	5.23	
41		10.72	12.87	85	4.14	5.17	
42		10.47	12.56	86	4.09	5.11	
43		10.23	12.27	87	4.04	5.05	
44		9.99	11.99	88	4.00	5.00	
45	7.82	9.77	11.73	89	3.95	4.94	
46	7.65	9.56	11.47	90	3.91	4.89	
47	7.48	9.36	11.23	91	3.87	4.83	
48	7.33	9.16	10.99	92	3.82	4.78	
49	7.18	8.97	10.77	93	3.78	4.73	
50	7.03	8.79	10.55	94		4.68	
51	6.90	8.62	10.35	95		4.63	
52	6.76	8.46	10.15	96		4.58	
53	6.64	8.30	9.96				
54	6.51	8.14	9.77				
55	6.40	7.99	9.59				
56	6.28	7.85	9.42				
57	6.17	7.71	9.26				
58	6.06	7.58	9.10				
59	5.96	7.45	8.94				
60	5.86	7.33	8.79				
61	5.77	7.21	8.65				
62	5.67	7.09	8.51				
63	5.58	6.97	8.38				
64	5.50	6.87	8.24				
Const's	351.75	439.69	527.63	Const's	351.75	439.69	527.63

# BAND DRIVE

## Twister Twist Gear Table.

FRONT ROLL  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inch Diameter. Ratio Cylinder to Whirl 1 to 3.41  
Whirl 2 inch Diameter Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			23.16	65T	4.99	6.23	7.48
22			22.10	66	4.91	6.14	7.37
23			21.14	67	4.83	6.05	7.26
24		16.88	20.26	68	4.77	5.96	7.15
25		16.21	19.45	69	4.70	5.87	7.05
26		15.59	18.70	70	4.63	5.79	6.95
27		15.01	18.01	71	4.57	5.71	6.85
28		14.47	17.37	72	4.50	5.63	6.75
29		13.97	16.77	73	4.44	5.55	
30		13.51	16.21	74	4.38	5.48	
31		13.07	15.69	75	4.32	5.40	
32		12.66	15.20	76	4.27	5.33	
33		12.28	14.74	77	4.21	5.26	
34		11.92	14.30	78	4.16	5.20	
35		11.59	13.89	79	4.11	5.13	
36		11.26	13.51	80	4.05	5.07	
37		10.95	13.14	81	4.00	5.00	
38		10.66	12.80	82	3.95	4.94	
39		10.39	12.47	83	3.91	4.88	
40		10.13	12.16	84	3.86	4.82	
41		9.88	11.86	85	3.81	4.77	
42		9.65	11.58	86	3.77	4.71	
43		9.42	11.31	87	3.73	4.66	
44		9.21	11.05	88	3.68	4.60	
45	7.20	9.01	10.81	89	3.64	4.55	
46	7.05	8.81	10.57	90	3.60	4.50	
47	6.90	8.62	10.35	91	3.56	4.45	
48	6.75	8.44	10.13	92	3.52	4.40	
49	6.62	8.27	9.92	93		4.36	
50	6.48	8.10	9.73	94	3.49	4.31	
51	6.36	7.95	9.53	95		4.27	
52	6.24	7.79	9.35	96		4.22	
53	6.12	7.65	9.17				
54	6.00	7.50	9.01				
55	5.89	7.37	8.84				
56	5.79	7.24	8.68				
57	5.69	7.11	8.53				
58	5.59	6.99	8.38				
59	5.49	6.87	8.24				
60	5.40	6.75	8.10				
61	5.31	6.64	7.97				
62	5.23	6.56	7.84				
63	5.15	6.43	7.72				
64	5.07	6.33	7.60				
Const's	324.18	405.23	486.27	Const's	324.18	405.23	486.27

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 7 inch Diameter      Ratio Cylinder to Whirl 1 to 2.66.

Whirl  $2\frac{1}{2}$  inch Diameter      Front Roll Gear 112 teeth.

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T	Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T
Gears	Stud 80 T	Stud 100 T	Stud 120 T	Gears	Stud 80 T	Stud 100 T	Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			18.06	65T	3.89	4.86	5.84
22			17.24	66	3.83	4.79	5.75
23			16.49	67	3.77	4.72	5.66
24		13.17	15.81	68	3.72	4.65	5.58
25		12.64	15.17	69	3.66	4.58	5.50
26		12.16	14.59	70	3.61	4.52	5.42
27		11.71	14.05	71	3.56	4.45	5.34
28		11.29	13.55	72	3.51	4.39	5.27
29		10.90	13.08	73	3.46	4.33	
30		10.54	12.64	74	3.42	4.27	
31		10.20	12.24	75	3.37	4.21	
32		9.88	11.85	76	3.33	4.16	
33		9.58	11.49	77	3.28	4.11	
34		9.30	11.16	78	3.24	4.05	
35		9.03	10.84	79	3.20	4.00	
36		8.78	10.54	80	3.16	3.95	
37		8.54	10.25	81	3.12	3.90	
38		8.32	9.98	82	3.08	3.85	
39		8.11	9.73	83	3.05	3.81	
40		7.90	9.48	84	3.01	3.76	
41		7.71	9.25	85	2.98	3.72	
42		7.53	9.03	86	2.94	3.68	
43		7.35	8.82	87	2.91	3.63	
44		7.18	8.62	88	2.87	3.59	
45	5.62	7.02	8.43	89	2.84	3.55	
46	5.49	6.87	8.25	90	2.81	3.51	
47	5.38	6.73	8.07	91	2.78	3.47	
48	5.27	6.59	7.90	92	2.75	3.44	
49	5.16	6.45	7.74	93	2.72	3.40	
50	5.06	6.32	7.59	94		3.36	
51	4.96	6.20	7.44	95		3.33	
52	4.86	6.08	7.29	96		3.29	
53	4.77	5.96	7.16				
54	4.68	5.85	7.02				
55	4.60	5.75	6.90				
56	4.52	5.64	6.77				
57	4.44	5.55	6.65				
58	4.36	5.45	6.54				
59	4.29	5.36	6.43				
60	4.21	5.27	6.32				
61	4.15	5.18	6.22				
62	4.08	5.10	6.12				
63	4.01	5.02	6.02				
64	3.95	4.94	5.93				
Const's	252.88	316.10	379.32	Const's	252.88	316.10	379.32



# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 8 inch Diameter      Ratio Cylinder to Whirl 1 to 8.28

Whirl  $\frac{1}{4}$  inch Diameter      Front Roll Gear 112 teeth.

Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T	Change	Cyl. 20 T	Cyl. 20 T	Cyl. 20 T
Gears	Stud 80 T	Stud 100 T	Stud 120 T	Gears	Stud 80 T	Stud 100 T	Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21 T			56.23	65 T	12.11	15.14	18.17
22			53.67	66	11.93	14.91	17.89
23			51.34	67	11.75	14.69	17.62
24		41.00	49.20	68	11.58	14.47	17.36
25		39.36	47.23	69	11.41	14.26	17.11
26		37.84	45.41	70	11.25	14.06	16.87
27		36.44	43.73	71	11.09	13.86	16.63
28		35.14	42.17	72	10.93	13.67	16.40
29		33.93	40.72	73	10.78	13.48	
30		32.80	39.36	74	10.64	13.30	
31		31.74	38.09	75	10.50	13.12	
32		30.75	36.90	76	10.36	12.95	
33		29.82	35.78	77	10.22	12.78	
34		28.94	34.73	78	10.09	12.61	
35		28.11	33.74	79	9.96	12.46	
36		27.33	32.80	80	9.84	12.30	
37		26.59	31.91	81	9.72	12.15	
38		25.89	31.07	82	9.60	12.00	
39		25.23	30.28	83	9.48	11.85	
40		24.60	29.52	84	9.37	11.71	
41		24.00	28.80	85	9.26	11.58	
42		23.43	28.11	86	9.15	11.44	
43		22.88	27.45	87	9.05	11.31	
44		22.36	26.84	88	8.95	11.18	
45	17.49	21.87	26.24	89	8.84	11.06	
46	17.11	21.39	25.67	90	8.75	10.93	
47	16.75	20.94	25.12	91	8.65	10.81	
48	16.40	20.50	24.60	92	8.56	10.70	
49	16.06	20.08	24.10	93	8.46	10.58	
50	15.74	19.68	23.62	94		10.47	
51	15.43	19.29	23.15	95		10.36	
52	15.14	18.92	22.71	96		10.25	
53	14.85	18.57	22.28				
54	14.58	18.22	21.87				
55	14.31	17.89	21.47				
56	14.06	17.57	21.08				
57	13.81	17.26	20.71				
58	13.57	16.96	20.36				
59	13.34	16.68	20.01				
60	13.12	16.40	19.68				
61	12.90	16.13	19.36				
62	12.70	15.87	19.04				
63	12.49	15.62	18.74				
64	12.30	15.37	18.45				
Const's	787.17	983.95	1180.75	Const's	787.17	983.95	1180.75

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 8 inch Diameter      Ratio Cylinder to Whirl 1 to 7.67.

Whirl  $1\frac{5}{16}$  inch Diameter      Front Roll Gear 112 Teeth.

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			52.08	65T	11.22	14.02	16.83
22			49.72	66	11.05	13.81	16.57
23			47.55	67	10.88	13.60	16.32
24		37.97	45.57	68	10.72	13.40	16.08
25		36.46	43.75	69	10.57	13.21	15.85
26		35.06	42.07	70	10.42	13.02	15.63
27		33.76	40.51	71	10.27	12.84	15.42
28		32.55	39.06	72	10.13	12.66	15.19
29		31.43	37.72	73	9.99	12.49	
30		30.37	36.46	74	9.85	12.32	
31		29.40	35.28	75	9.72	12.15	
32		28.48	34.18	76	9.59	11.99	
33		27.62	33.14	77	9.47	11.84	
34		26.81	32.17	78	9.35	11.70	
35		26.04	31.25	79	9.23	11.54	
36		25.32	30.38	80	9.11	11.39	
37		24.63	29.56	81	9.00	11.25	
38		23.99	28.78	82	8.89	11.12	
39		23.37	28.05	83	8.79	10.98	
40		22.79	27.34	84	8.68	10.85	
41		22.23	26.68	85	8.58	10.72	
42		21.70	26.04	86	8.48	10.60	
43		21.20	25.44	87	8.38	10.48	
44		20.72	24.86	88	8.29	10.36	
45	16.20	20.25	24.31	89	8.19	10.24	
46	15.85	19.81	23.78	90	8.10	10.13	
47	15.51	19.39	23.27	91	8.01	10.02	
48	15.19	18.99	22.79	92	7.93	9.91	
49	14.88	18.60	22.32	93	7.84	9.80	
50	14.58	18.23	21.88	94		9.70	
51	14.30	17.87	21.45	95		9.59	
52	14.02	17.53	21.03	96		9.49	
53	13.76	17.20	20.64				
54	13.50	16.88	20.25				
55	13.26	16.57	19.89				
56	13.02	16.27	19.53				
57	12.79	15.99	19.19				
58	12.57	15.71	18.86				
59	12.36	15.45	18.54				
60	12.15	15.19	18.23				
61	11.95	14.94	17.93				
62	11.76	14.70	17.64				
63	11.57	14.47	17.36				
64	11.39	14.24	17.09				
Const's	729.17	911.47	1093.76	Const's	729.17	911.47	1093.76

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 7.08

Whirl 1 inch Diameter.      Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			48.08	65T	10.36	12.93	15.53
22			45.89	66	10.20	12.75	15.30
23			43.85	67	10.05	12.56	15.07
24		35.06	42.07	68	9.90	12.37	14.85
25		33.65	40.38	69	9.75	12.19	14.63
26		32.40	38.83	70	9.61	12.02	14.42
27		31.16	37.39	71	9.48	11.85	14.22
28		30.05	36.06	72	9.35	11.69	14.03
29		29.01	34.81	73	9.22	11.53	
30		28.04	33.65	74	9.10	11.37	
31		27.14	32.57	75	8.97	11.22	
32		26.29	31.55	76	8.86	11.07	
33		25.49	30.59	77	8.74	10.93	
34		24.74	29.69	78	8.63	10.79	
35		24.04	28.85	79	8.52	10.65	
36		23.37	28.04	80	8.41	10.52	
37		22.74	27.29	81	8.31	10.39	
38		22.14	26.57	82	8.21	10.26	
39		21.57	25.89	83	8.11	10.14	
40		21.01	25.24	84	8.01	10.02	
41		20.52	24.63	85	7.92	9.89	
42		20.03	24.04	86	7.83	9.78	
43		19.57	23.48	87	7.74	9.67	
44		19.12	22.95	88	7.65	9.56	
45	14.96	18.69	22.44	89	7.56	9.45	
46	14.63	18.29	21.95	90	7.48	9.35	
47	14.32	17.90	21.48	91	7.40	9.25	
48	14.02	17.52	21.03	92	7.32	9.15	
49	13.74	17.17	20.60	93	7.24	9.05	
50	13.46	16.82	20.19	94		8.95	
51	13.19	16.50	19.80	95		8.86	
52	12.94	16.18	19.42	96		8.76	
53	12.70	15.87	19.05				
54	12.46	15.58	18.70				
55	12.24	15.30	18.36				
56	12.02	15.02	18.02				
57	11.81	14.76	17.71				
58	11.61	14.51	17.41				
59	11.41	14.26	17.11				
60	11.22	14.02	16.83				
61	11.03	13.79	16.55				
62	10.86	13.57	16.28				
63	10.68	13.35	16.03				
64	10.52	13.15	15.78				
Const's	673.08	841.35	1009.63	Const's	673.08	841.35	1009.63

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  Inch Diameter.**

Cylinder 8 inches Diameter.      Ratio Cylinder to Whirl 1 to 6.80

Whirl 1  $\frac{1}{16}$  inch Diameter.      Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			46.18	65T	9.95	12.43	14.92
22			44.08	66	9.79	12.24	14.69
23			42.16	67	9.65	12.06	14.47
24		33.67	40.40	68	9.51	11.88	14.26
25		32.32	38.79	69	9.37	11.71	14.05
26		31.08	37.30	70	9.24	11.54	13.85
27		29.93	35.91	71	9.11	11.38	13.66
28		28.86	34.63	72	8.98	11.22	13.47
29		27.86	33.44	73	8.86	11.07	
30		26.94	32.32	74	8.74	10.92	
31		26.07	31.28	75	8.62	10.77	
32		25.25	30.30	76	8.51	10.63	
33		24.49	29.38	77	8.40	10.49	
34		23.77	28.52	78	8.29	10.36	
35		23.09	27.71	79	8.18	10.23	
36		22.45	26.94	80	8.08	10.10	
37		21.84	26.21	81	7.98	9.98	
38		21.27	25.52	82	7.88	9.85	
39		20.72	24.86	83	7.79	9.74	
40		20.20	24.24	84	7.70	9.62	
41		19.71	23.65	85	7.61	9.51	
42		19.24	23.09	86	7.52	9.40	
43		18.79	22.55	87	7.43	9.29	
44		18.37	22.04	88	7.35	9.18	
45	14.37	17.96	21.55	89	7.26	9.08	
46	14.05	17.57	21.08	90	7.18	8.97	
47	13.75	17.19	20.63	91	7.10	8.88	
48	13.47	16.84	20.20	92	7.03	8.78	
49	13.19	16.49	19.79	93	6.95	8.69	
50	12.93	16.16	19.39	94		8.60	
51	12.68	15.84	19.01	95		8.51	
52	12.43	15.54	18.65	96		8.42	
53	12.20	15.25	18.30				
54	11.97	14.96	17.96				
55	11.75	14.69	17.63				
56	11.54	14.43	17.32				
57	11.34	14.18	17.01				
58	11.15	13.93	16.72				
59	10.96	13.70	16.44				
60	10.77	13.46	16.16				
61	10.60	13.25	15.90				
62	10.43	13.03	15.64				
63	10.26	12.83	15.39				
64	10.10	12.63	15.15				
Const's	646.46	808.08	969.70	Const's	646.46	808.08	969.70

# BAND DRIVE Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 8 inch Diameter.      Ratio Cylinder to Whirl 1 to 6.22.

Whirl  $1\frac{1}{8}$  inch Diameter.      Front Roll Gear 112 Teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21 T			42.24	65 T	9.10	11.38	13.65
22			40.32	66	8.96	11.20	13.44
23			38.56	67	8.82	11.03	13.24
24		30.80	36.96	68	8.70	10.87	13.04
25		29.57	35.48	69	8.57	10.72	12.86
26		28.43	34.12	70	8.45	10.56	12.67
27		27.38	32.85	71	8.31	10.41	12.49
28		26.40	31.68	72	8.21	10.27	12.32
29		25.49	30.59	73	8.10	10.13	
30		24.64	29.57	74	7.99	9.99	
31		23.84	28.61	75	7.88	9.87	
32		23.10	27.72	76	7.78	9.75	
33		22.40	26.88	77	7.68	9.61	
34		21.74	26.09	78	7.58	9.47	
35		21.12	25.34	79	7.49	9.36	
36		20.53	24.64	80	7.39	9.24	
37		19.98	23.97	81	7.30	9.12	
38		19.45	23.34	82	7.21	9.01	
39		18.95	22.74	83	7.12	8.91	
40		18.48	22.17	84	7.04	8.80	
41		18.03	21.63	85	6.96	8.69	
42		17.60	21.12	86	6.88	8.59	
43		17.19	20.64	87	6.80	8.49	
44		16.80	20.16	88	6.72	8.40	
45	13.14	16.43	19.72	89	6.64	8.31	
46	12.85	16.07	19.28	90	6.57	8.22	
47	12.58	15.73	18.88	91	6.50	8.13	
48	12.32	15.40	18.48	92	6.43	8.04	
49	12.07	15.08	18.11	93	6.36	7.95	
50	11.83	14.78	17.74	94		7.87	
51	11.60	14.49	17.40	95		7.78	
52	11.37	14.21	17.06	96		7.70	
53	11.16	13.95	16.74				
54	10.95	13.69	16.42				
55	10.75	13.45	16.13				
56	10.56	13.20	15.84				
57	10.37	12.97	15.57				
58	10.20	12.74	15.29				
59	10.02	12.53	15.03				
60	9.86	12.32	14.78				
61	9.69	12.12	14.54				
62	9.54	11.92	14.31				
63	9.39	11.73	14.09				
64	9.26	11.55	13.86				
Const's	591.33	739.16	886.99	Const's	591.33	739.16	886.99

# BAND DRIVE

## Twister Twist Gear Table

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter**

Cylinder 8 inches diameter.      Ratio Cylinder to Whirl 1 to 5.48

Whirl 1  $\frac{5}{16}$  inch diameter.      Front Roll Gear 112 teeth

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21 T			37.21	65T	8.01	10.02	12.02
22			35.52	66	7.89	9.87	11.84
23			33.98	67	7.78	9.72	11.66
24		27.13	32.56	68	7.66	9.57	11.49
25		26.05	31.26	69	7.55	9.44	11.33
26		25.05	30.06	70	7.44	9.31	11.16
27		24.12	28.95	71	7.34	9.17	11.01
28		23.26	27.91	72	7.24	9.04	10.85
29		22.46	26.94	73	7.14	8.92	
30		21.71	26.05	74	7.04	8.80	
31		21.01	25.21	75	6.95	8.69	
32		20.35	24.42	76	6.85	8.57	
33		19.74	23.68	77	6.77	8.46	
34		19.15	22.98	78	6.68	8.35	
35		18.61	22.33	79	6.59	8.25	
36		18.09	21.71	80	6.51	8.14	
37		17.60	21.12	81	6.43	8.04	
38		17.14	20.56	82	6.35	7.94	
39		16.70	20.04	83	6.28	7.84	
40		16.28	19.54	84	6.20	7.75	
41		15.88	19.06	85	6.13	7.66	
42		15.51	18.61	86	6.06	7.57	
43		15.14	18.17	87	5.99	7.48	
44		14.80	17.76	88	5.92	7.40	
45	11.58	14.47	17.37	89	5.85	7.32	
46	11.33	14.16	16.99	90	5.79	7.23	
47	11.08	13.86	16.63	91	5.73	7.15	
48	10.85	13.57	16.28	92	5.66	7.08	
49	10.63	13.29	15.95	93	5.60	7.00	
50	10.42	13.02	15.63	94		6.93	
51	10.22	12.78	15.32	95		6.86	
52	10.02	12.53	15.03	96		6.78	
53	9.83	12.30	14.74				
54	9.65	12.06	14.47				
55	9.47	11.85	14.21				
56	9.30	11.63	13.95				
57	9.14	11.43	13.71				
58	8.98	11.23	13.47				
59	8.83	11.04	13.25				
60	8.68	10.85	13.02				
61	8.54	10.68	12.81				
62	8.40	10.51	12.60				
63	8.27	10.34	12.40				
64	8.14	10.17	12.21				
Const's	520.97	651.22	781.46	Const's	520.97	651.22	781.46

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

**Cylinder 8 inch Diameter.**

**Ratio Cylinder to Whirl 1 to 4.37.**

**Whirl  $1\frac{5}{8}$  inch Diameter.**

**Front Roll Gear 112 Teeth.**

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			29.67	65T	6.40	7.99	9.59
22			28.32	66	6.30	7.87	9.44
23			27.00	67	6.21	7.75	9.30
24		21.64	25.96	68	6.12	7.64	9.16
25		20.77	24.93	69	6.02	7.53	9.03
26		19.97	23.96	70	5.94	7.42	8.90
27		19.23	23.08	71	5.86	7.31	8.78
28		18.54	22.26	72	5.78	7.21	8.66
29		17.90	21.49	73	5.70	7.11	
30		17.31	20.77	74	5.62	7.02	
31		16.75	20.10	75	5.55	6.92	
32		16.23	19.47	76	5.47	6.83	
33		15.74	18.88	77	5.40	6.74	
34		15.28	18.33	78	5.33	6.66	
35		14.84	17.80	79	5.27	6.57	
36		14.43	17.31	80	5.20	6.49	
37		14.04	16.84	81	5.14	6.41	
38		13.67	16.40	82	5.07	6.33	
39		13.32	15.98	83	5.01	6.26	
40		12.98	15.58	84	4.95	6.18	
41		12.67	15.20	85	4.89	6.11	
42		12.36	14.83	86	4.84	6.04	
43		12.08	14.49	87	4.78	5.97	
44		11.80	14.16	88	4.73	5.90	
45	9.25	11.54	13.85	89	4.67	5.83	
46	9.04	11.29	13.55	90	4.62	5.77	
47	8.85	11.05	13.26	91	4.57	5.71	
48	8.67	10.82	12.98	92	4.52	5.64	
49	8.49	10.60	12.72	93	4.47	5.58	
50	8.32	10.39	12.46	94		5.52	
51	8.16	10.18	12.22	95		5.47	
52	8.00	9.99	11.98	96		5.41	
53	7.85	9.80	11.76				
54	7.70	9.62	11.54				
55	7.56	9.44	11.33				
56	7.43	9.27	11.13				
57	7.30	9.11	10.93				
58	7.17	8.95	10.74				
59	7.05	8.80	10.56				
60	6.93	8.66	10.39				
61	6.82	8.51	10.22				
62	6.71	8.37	10.05				
63	6.60	8.24	9.89				
64	6.50	8.11	9.74				
Const's	416.04	519.31	623.17	Const's	416.04	519.31	623.17



# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 4.12.

Whirl  $1\frac{1}{4}$  inch Diameter.

Front Roll Gear 112 Teeth.

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21 T			27.98	65 T	6.03	7.53	9.04
22			26.71	66	5.93	7.42	8.90
23			25.54	67	5.85	7.31	8.77
24		20.40	24.48	68	5.76	7.20	8.64
25		19.58	23.50	69	5.68	7.10	8.51
26		18.83	22.60	70	5.60	6.99	8.39
27		18.13	21.76	71	5.52	6.90	8.27
28		17.49	20.98	72	5.44	6.80	8.16
29		16.88	20.26	73	5.37	6.71	
30		16.32	19.58	74	5.29	6.62	
31		15.79	18.95	75	5.22	6.53	
32		15.30	18.36	76	5.15	6.44	
33		14.84	17.80	77	5.09	6.36	
34		14.40	17.28	78	5.02	6.28	
35		13.99	16.79	79	4.96	6.20	
36		13.60	16.32	80	4.90	6.12	
37		13.23	15.88	81	4.83	6.04	
38		12.88	15.46	82	4.78	5.97	
39		12.55	15.06	83	4.72	5.90	
40		12.24	14.69	84	4.66	5.83	
41		11.94	14.33	85	4.61	5.76	
42		11.66	13.99	86	4.55	5.69	
43		11.39	13.66	87	4.50	5.63	
44		11.12	13.35	88	4.45	5.56	
45	8.70	10.88	13.06	89	4.40	5.50	
46	8.51	10.64	12.77	90	4.35	5.44	
47	8.33	10.42	12.50	91	4.30	5.38	
48	8.16	10.20	12.24	92	4.26	5.32	
49	7.99	9.99	11.99	93	4.21	5.26	
50	7.83	9.79	11.75	94		5.21	
51	7.68	9.60	11.52	95		5.15	
52	7.53	9.42	11.30	96		5.10	
53	7.39	9.24	11.09				
54	7.25	9.07	10.87				
55	7.12	8.90	10.68				
56	6.99	8.74	10.49				
57	6.87	8.59	10.31				
58	6.75	8.44	10.13				
59	6.64	8.30	9.96				
60	6.53	8.16	9.79				
61	6.42	8.03	9.63				
62	6.32	7.90	9.48				
63	6.22	7.77	9.33				
64	6.12	7.65	9.18				
Const's	391.68	489.60	587.52	Const's	391.68	489.60	587.52

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 3.88

Whirl 2 inch Diameter

Front Roll Gear 112 Teeth

Change	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
Gears	Twist	Twist	Twist	Gears	Twist	Twist	Twist
21T			26.35	65T	5.67	7.09	8.51
22			25.15	66	5.59	6.99	8.38
23			24.06	67	5.51	6.88	8.26
24		19.21	23.05	68	5.42	6.78	8.14
25		18.44	22.13	69	5.35	6.68	8.02
26		17.73	21.28	70	5.27	6.58	8.90
27		17.08	20.49	71	5.19	6.49	7.79
28		16.47	19.76	72	5.12	6.40	7.68
29		15.90	19.08	73	5.05	6.32	
30		15.37	18.44	74	4.99	6.23	
31		14.87	17.85	75	4.92	6.15	
32		14.40	17.29	76	4.85	6.07	
33		13.97	16.77	77	4.79	5.99	
34		13.56	16.27	78	4.73	5.91	
35		13.17	15.81	79	4.67	5.84	
36		12.81	15.37	80	4.61	5.76	
37		12.46	14.95	81	4.55	5.69	
38		12.13	14.56	82	4.50	5.62	
39		11.82	14.19	83	4.44	5.56	
40		11.53	13.83	84	4.39	5.49	
41		11.25	13.50	85	4.34	5.42	
42		10.98	13.17	86	4.29	5.36	
43		10.72	12.87	87	4.24	5.30	
44		10.48	12.58	88	4.19	5.24	
45	8.20	10.25	12.30	89	4.14	5.18	
46	8.02	10.02	12.03	90	4.10	5.12	
47	7.85	9.81	11.77	91	4.05	5.07	
48	7.69	9.61	11.53	92	4.01	5.01	
49	7.53	9.41	11.29	93	3.97	4.96	
50	7.38	9.22	11.07	94		4.91	
51	7.23	9.04	10.85	95		4.85	
52	7.09	8.87	10.64	96		4.80	
53	6.96	8.70	10.44				
54	6.83	8.54	10.25				
55	6.71	8.38	10.06				
56	6.59	8.23	9.88				
57	6.47	8.08	9.71				
58	6.36	7.95	9.54				
59	6.25	7.81	9.38				
60	6.15	7.68	9.22				
61	6.05	7.56	9.07				
62	5.95	7.44	8.92				
63	5.86	7.32	8.78				
64	5.76	7.20	8.65				
Const's	368.87	461.08	553.30	Const's	368.87	461.08	553.30

# BAND DRIVE

## Twister Twist Gear Table.

**FRONT ROLL  $1\frac{1}{2}$  inch Diameter.**

Cylinder 8 inch Diameter.

Ratio Cylinder to Whirl 1 to 3.03.

Whirl  $2\frac{1}{2}$  inch Diameter.

Front Roll Gear 112 Teeth.

Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T	Change Gears	Cyl. 20 T Stud 80 T	Cyl. 20 T Stud 100 T	Cyl. 20 T Stud 120 T
	Twist	Twist	Twist		Twist	Twist	Twist
21T			20.58	65T	4.43	5.54	6.65
22			19.64	66	4.36	5.46	6.55
23			18.79	67	4.30	5.37	6.45
24		15.00	18.00	68	4.24	5.30	6.35
25		14.40	17.28	69	4.17	5.22	6.26
26		13.85	16.62	70	4.12	5.14	6.17
27		13.34	16.00	71	4.06	5.07	6.09
28		12.86	15.43	72	4.00	5.00	6.00
29		12.41	14.90	73	3.95	4.93	
30		12.00	14.40	74	3.89	4.87	
31		11.62	13.94	75	3.84	4.80	
32		11.25	13.50	76	3.79	4.74	
33		10.91	13.09	77	3.74	4.68	
34		10.59	12.71	78	3.69	4.62	
35		10.29	12.34	79	3.65	4.56	
36		10.00	12.00	80	3.60	4.50	
37		9.73	11.68	81	3.56	4.45	
38		9.48	11.37	82	3.51	4.39	
39		9.23	11.08	83	3.47	4.34	
40		9.00	10.80	84	3.43	4.29	
41		8.78	10.54	85	3.39	4.24	
42		8.57	10.29	86	3.35	4.19	
43		8.37	10.05	87	3.31	4.13	
44		8.18	9.82	88	3.27	4.09	
45	6.40	8.00	9.60	89	3.24	4.05	
46	6.26	7.83	9.39	90	3.20	4.00	
47	6.13	7.66	9.19	91	3.17	3.96	
48	6.00	7.50	9.00	92	3.13	3.91	
49	5.88	7.35	8.82	93	3.10	3.87	
50	5.76	7.20	8.64	94		3.83	
51	5.65	7.06	8.47	95		3.79	
52	5.54	6.92	8.31	96		3.75	
53	5.44	6.79	8.15				
54	5.33	6.67	8.00				
55	5.24	6.54	7.86				
56	5.14	6.43	7.72				
57	5.05	6.32	7.58				
58	4.97	6.21	7.45				
59	4.88	6.10	7.32				
60	4.80	6.00	7.20				
61	4.72	5.90	7.08				
62	4.65	5.81	6.97				
63	4.57	5.72	6.86				
64	4.50	5.63	6.75				
Const's	288.06	360.07	432.09	Const's	288.06	360.07	432.09

# BAND DRIVE

## Twister Change Twist Gear Tables.

Cylinder 7 in. Diameter. Whirl  $\frac{7}{8}$  in. Diameter.  
Speed Ratio of Cylinder to Whirl 1 to 7.25.

Change Gear.	Cyl. 22T.	Stud 88T.	Cyl. 36T.	Stud 74T.	Cyl. 55T.	Stud 55T.
	$1\frac{1}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear
	Twist.	Twist.	Twist.	Twist.	Twist.	Twist.
15	48.32	45.93	24.83	23.60	12.08	11.48
16	45.30	43.06	23.28	22.14	11.02	10.76
17	42.63	40.53	21.91	20.83	10.66	10.13
18	40.27	38.28	20.69	19.67	10.07	9.57
19	38.15	36.26	19.60	18.63	9.54	9.06
20	36.24	34.44	18.62	17.70	9.06	8.61
21	34.51	32.81	17.74	16.86	8.63	8.20
22	32.95	31.32	16.93	16.08	8.24	7.83
23	31.51	29.96	16.19	15.35	7.88	7.49
24	30.20	28.71	15.52	14.75	7.55	7.18
25	28.99	27.56	14.90	14.16	7.25	6.89
26	27.88	26.50	14.33	13.62	6.97	6.62
27	26.84	25.52	13.79	13.11	6.71	6.38
28	25.89	24.61	13.30	12.66	6.47	6.15
29	24.99	23.75	12.84	12.21	6.25	5.94
30	24.16	22.96	12.41	11.80	6.04	5.74
31	23.38	22.22	12.01	11.42	5.84	5.55
32	22.65	21.53	11.64	11.06	5.66	5.38
33	21.96	20.88	11.28	10.73	5.49	5.22
34	21.32	20.26	10.95	10.41	5.33	5.06
35	20.71	19.68	10.64	10.11	5.18	4.92
36	20.13	19.13	10.34	9.84	5.03	4.78
37	19.59	18.62	10.06	9.57	4.90	4.65
38	19.07	18.13	9.80	9.32	4.77	4.53
39	18.58	17.69	9.55	9.08	4.64	4.42
40	18.12	17.22	9.31	8.85	4.53	4.30
41	17.68	16.80	9.08	8.63	4.42	4.20
42	17.26	16.40	8.87	8.43	4.31	4.10
43	16.85	16.02	8.66	8.23	4.21	4.00
44	16.47	15.66	8.46	8.04	4.12	3.91
45	16.11	15.33	8.27	7.86	4.03	3.83
46	15.76	14.98	8.09	7.69	3.94	3.74
47	15.42	14.66	7.92	7.53	3.85	3.66
48	15.10	14.35	7.76	7.37	3.77	3.59
49	14.79	14.06	7.60	7.22	3.70	3.51
50	14.49	13.78	7.45	7.08	3.62	3.44
51	14.21	13.51	7.30	6.94	3.55	3.38
52	13.94	13.25	7.16	6.81	3.48	3.31
53	13.67	13.00	7.03	6.68	3.42	3.25
54	13.42	12.76	6.90	6.55	3.35	3.19
55	13.18	12.54	6.77	6.44	3.29	3.13
56	12.94	12.30	6.65	6.32	3.23	3.07
57	12.72	12.10	6.53	6.21	3.18	3.02
58	12.50	11.88	6.42	6.10	3.12	2.97
59	12.28	11.69	6.31	6.00	3.07	2.92
60	12.08	11.48	6.21	5.90	3.02	2.87

# BAND DRIVE

## Twister Change Twist Gear Tables.

Cylinder 7 in. Diameter.      Whirl  $1\frac{5}{16}$  in. Diameter.  
Speed Ratio of Cylinder to Whirl 1 to 4.80.

Change Gear.	Cyl. 22T.	Stud 88T.	Cyl. 36T.	Stud 74T.	Cyl. 55T.	Stud 55T.
	$1\frac{3}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{8}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear
	Twist.	Twist.	Twist.	Twist.	Twist.	Twist.
15	32.00	30.41	16.44	15.63	8.00	7.60
16	30.00	28.51	15.41	14.65	7.50	7.13
17	28.23	26.83	14.50	13.79	7.06	6.71
18	26.66	25.34	13.70	13.02	6.67	6.33
19	25.26	24.01	12.98	12.34	6.32	6.00
20	24.00	22.80	12.33	11.72	6.00	5.70
21	22.85	21.72	11.74	11.16	5.71	5.43
22	21.81	20.73	11.21	10.66	5.45	5.18
23	20.86	19.83	10.72	10.19	5.22	4.96
24	20.00	19.01	10.28	9.77	5.00	4.75
25	19.20	18.24	9.86	9.38	4.80	4.56
26	18.46	17.54	9.49	9.02	4.61	4.38
27	17.77	16.89	9.13	8.68	4.44	4.22
28	17.14	16.29	8.81	8.37	4.29	4.07
29	16.55	15.73	8.50	8.08	4.14	3.93
30	16.00	15.20	8.22	7.81	4.00	3.80
31	15.48	14.71	7.96	7.56	3.87	3.68
32	15.00	14.27	7.70	7.33	3.75	3.57
33	14.54	13.82	7.47	7.10	3.64	3.45
34	14.11	13.41	7.25	6.89	3.53	3.35
35	13.71	13.03	7.05	6.70	3.43	3.26
36	13.33	12.67	6.85	6.51	3.33	3.17
37	12.97	12.33	6.67	6.33	3.24	3.08
38	12.63	12.00	6.49	6.17	3.16	3.00
39	12.30	11.68	6.32	6.01	3.08	2.92
40	12.00	11.40	6.16	5.86	3.00	2.85
41	11.70	11.13	6.01	5.72	2.93	2.78
42	11.42	10.87	5.87	5.58	2.86	2.72
43	11.16	10.61	5.73	5.45	2.79	2.65
44	10.90	10.34	5.60	5.33	2.73	2.58
45	10.66	10.13	5.48	5.21	2.67	2.53
46	10.43	9.92	5.36	5.09	2.61	2.48
47	10.21	9.71	5.25	4.99	2.55	2.43
48	10.00	9.50	5.14	4.88	2.50	2.37
49	9.79	9.31	5.03	4.78	2.45	2.33
50	9.60	9.12	4.93	4.69	2.40	2.28
51	9.41	8.95	4.83	4.60	2.35	2.24
52	9.23	8.77	4.74	4.51	2.31	2.19
53	9.05	8.61	4.65	4.43	2.26	2.15
54	8.88	8.45	4.57	4.34	2.22	2.11
55	8.72	8.30	4.48	4.27	2.18	2.08
56	8.57	8.14	4.40	4.19	2.14	2.03
57	8.42	8.01	4.33	4.12	2.11	2.00
58	8.27	7.86	4.25	4.04	2.07	1.96
59	8.13	7.74	4.18	3.98	2.03	1.93
60	8.00	7.60	4.11	3.91	2.00	1.90

# BAND DRIVE

## Twister Change Twist Gear Tables.

Cylinder 8 in. Diameter.                      Whirl  $\frac{7}{8}$  in. Diameter.  
Speed Ratio of Cylinder to Whirl 1 to 8.28.

Change Gear.	Cyl. 22T.	Stud 88T.	Cyl. 36T.	Stud 74T.	Cyl. 55T.	Stud 55T.
	$1\frac{3}{4}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{4}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear	$1\frac{3}{4}$ in. Roll 108T. Gear	$1\frac{1}{2}$ in. Roll 112T. Gear
	Twist.	Twist.	Twist.	Twist.	Twist.	Twist.
15	55.18	52.46	28.36	26.96	13.79	13.11
16	51.73	49.18	26.58	25.27	12.93	12.29
17	48.70	46.28	25.02	23.78	12.17	11.57
18	45.98	43.71	23.63	22.46	11.49	10.93
19	43.56	41.41	22.38	21.28	10.89	10.35
20	41.38	39.34	21.27	20.21	10.34	9.83
21	39.41	37.47	20.25	19.25	9.85	9.37
22	37.62	35.77	19.34	18.38	9.41	8.94
23	35.99	34.21	18.49	17.58	9.00	8.55
24	34.49	32.78	17.72	16.85	8.62	8.19
25	33.11	31.47	17.01	16.17	8.28	7.87
26	31.84	30.26	16.36	15.55	7.96	7.56
27	30.66	29.14	15.75	14.98	7.66	7.28
28	29.56	28.10	15.19	14.44	7.39	7.02
29	28.54	27.13	14.67	13.94	7.13	6.78
30	27.59	26.23	14.18	13.47	6.90	6.56
31	26.70	25.38	13.72	13.04	6.68	6.34
32	25.87	24.59	13.29	12.64	6.47	6.15
33	25.08	23.84	12.89	12.25	6.27	5.96
34	24.34	23.14	12.51	11.89	6.08	5.78
35	23.65	22.48	12.15	11.55	5.91	5.62
36	22.99	21.86	11.81	11.23	5.75	5.46
37	22.37	21.26	11.49	10.93	5.59	5.31
38	21.78	20.71	11.19	10.64	5.44	5.18
39	21.22	20.17	10.91	10.36	5.30	5.04
40	20.69	19.67	10.63	10.11	5.17	4.92
41	20.19	19.19	10.37	9.86	5.05	4.80
42	19.71	18.73	10.12	9.63	4.93	4.68
43	19.25	18.34	9.89	9.40	4.81	4.58
44	18.81	17.88	9.67	9.19	4.70	4.47
45	18.39	17.48	9.45	8.98	4.60	4.37
46	17.99	17.11	9.25	8.79	4.50	4.28
47	17.61	16.74	9.05	8.60	4.40	4.18
48	17.24	16.39	8.86	8.42	4.31	4.10
49	16.89	16.06	8.68	8.25	4.22	4.01
50	16.55	15.73	8.51	8.09	4.14	3.93
51	16.23	15.44	8.34	7.93	4.06	3.86
52	15.92	15.13	8.18	7.77	3.98	3.78
53	15.62	14.86	8.02	7.64	3.90	3.71
54	15.31	14.57	7.88	7.49	3.83	3.64
55	15.05	14.32	7.73	7.36	3.76	3.58
56	14.78	14.05	7.59	7.22	3.69	3.51
57	14.52	13.82	7.46	7.10	3.63	3.45
58	14.27	13.56	7.33	6.97	3.57	3.39
59	14.03	13.35	7.21	6.86	3.51	3.34
60	13.80	13.11	7.09	6.74	3.45	3.28

# BAND DRIVE

## Twister Change Twist Gear Tables.

Cylinder 8 in. Diameter. Whirl  $1\frac{5}{16}$  in. Diameter.  
Speed Ratio of Cylinder to Whirl 1 to 5.48.

Change Gear.	Cyl. 22T.	Stud 88T.	Cyl. 36T.	Stud 74T.	Cyl. 55T.	Stud 55T.
	$1\frac{3}{8}$ in. Roll 108T.Gear	$1\frac{1}{2}$ in. Roll 112T.Gear	$1\frac{3}{8}$ in. Roll 108T.Gear	$1\frac{1}{2}$ in. Roll 112T.Gear	$1\frac{3}{8}$ in. Roll 108T.Gear	$1\frac{1}{2}$ in. Roll 112T.Gear
	Twist.	Twist.	Twist.	Twist.	Twist.	Twist.
15	36.53	34.72	18.77	17.84	9.13	8.68
16	34.25	32.55	17.60	16.73	8.56	8.14
17	32.23	30.63	16.56	15.74	8.06	7.66
18	30.44	28.93	15.64	14.86	7.61	7.24
19	28.84	27.41	14.82	14.08	7.21	6.85
20	27.40	26.04	14.08	13.38	6.85	6.51
21	26.09	24.79	13.41	12.74	6.52	6.20
22	24.90	23.67	12.80	12.16	6.22	5.92
23	23.82	22.64	12.24	11.64	5.95	5.66
24	22.83	21.69	11.73	11.15	5.71	5.42
25	21.92	20.83	11.26	10.71	5.48	5.21
26	21.07	20.03	10.83	10.29	5.27	5.01
27	20.29	19.29	10.43	9.91	5.06	4.82
28	19.57	18.60	10.06	9.56	4.89	4.65
29	18.89	17.95	9.71	9.21	4.72	4.49
30	18.26	17.35	9.38	8.92	4.56	4.34
31	17.67	16.80	9.08	8.63	4.42	4.20
32	17.12	16.28	8.80	8.36	4.28	4.07
33	16.60	15.78	8.53	8.11	4.15	3.94
34	16.11	15.31	8.28	7.86	4.03	3.83
35	15.65	14.88	8.04	7.65	3.91	3.72
36	15.22	14.46	7.82	7.43	3.80	3.61
37	14.81	14.07	7.61	7.23	3.70	3.52
38	14.42	13.70	7.41	7.04	3.60	3.42
39	14.05	13.35	7.22	6.86	3.51	3.34
40	13.70	13.02	7.04	6.69	3.42	3.25
41	13.36	12.70	6.87	6.53	3.34	3.17
42	13.04	12.40	6.70	6.37	3.26	3.10
43	12.74	12.11	6.55	6.22	3.18	3.03
44	12.45	11.83	6.40	6.08	3.11	2.96
45	12.17	11.57	6.25	5.95	3.04	2.89
46	11.91	11.32	6.12	5.82	2.98	2.83
47	11.65	11.08	5.99	5.69	2.91	2.77
48	11.41	10.85	5.86	5.57	2.85	2.71
49	11.18	10.63	5.74	5.46	2.79	2.66
50	10.96	10.41	5.63	5.35	2.74	2.60
51	10.74	10.22	5.52	5.25	2.68	2.56
52	10.53	10.01	5.41	5.15	2.63	2.50
53	10.34	9.83	5.31	5.05	2.58	2.46
54	10.14	9.65	5.21	4.96	2.53	2.41
55	9.96	9.48	5.12	4.87	2.49	2.37
56	9.78	9.30	5.03	4.78	2.44	2.32
57	9.61	9.14	4.94	4.70	2.40	2.29
58	9.44	8.98	4.85	4.62	2.36	2.24
59	9.28	8.83	4.77	4.54	2.32	2.21
60	9.13	8.66	4.69	4.46	2.28	2.16



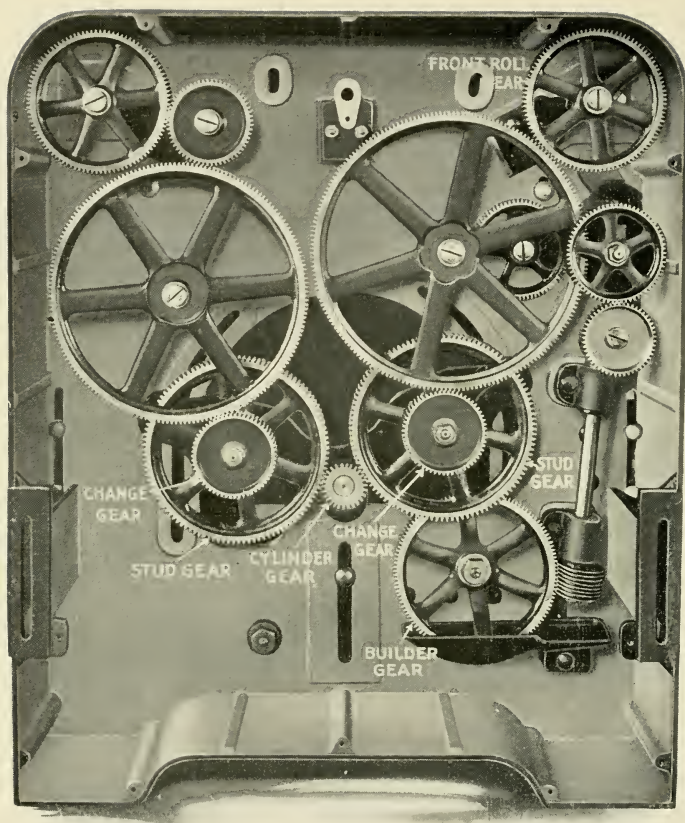
# BAND DRIVE

## Twister Change Twist Gear Table.

Whirl 2 inches diameter.

Front Roll  $1\frac{1}{2}$  inch diameter. Front Roll Gear 112 teeth.

Change Gear	Cylinder 7 in. diam. Cyl. : Whirl :: 1 : 3.41.			Cylinder 8 in. diam. Cyl. : Whirl :: 1 : 3.88		
	Cyl. 22T. Stud 88T.	Cyl. 36T. Stud 74T.	Cyl. 55T. Stud. 55T.	Cyl. 22T. Stud 88T.	Cyl. 36T. Stud 74T.	Cyl. 55T. Stud 55T.
	Twist.	Twist.	Twist.	Twist.	Twist.	Twist
20T	16.20	8.32	4.05	18.43	9.47	4.61
21	15.43	7.93	3.86	17.56	9.02	4.39
22	14.73	7.57	3.68	16.76	8.61	4.19
23	14.09	7.24	3.52	16.03	8.24	4.01
24	13.50	6.94	3.38	15.37	7.90	3.84
25	12.96	6.66	3.24	14.75	7.58	3.69
26	12.46	6.41	3.12	14.18	7.29	3.55
27	12.00	6.17	3.00	13.66	7.02	3.41
28	11.57	5.95	2.89	13.17	6.77	3.29
29	11.17	5.74	2.79	12.71	6.53	3.18
30	10.80	5.55	2.70	12.29	6.32	3.07
31	10.45	5.37	2.61	11.89	6.11	2.97
32	10.12	5.20	2.53	11.52	5.92	2.88
33	9.82	5.05	2.45	11.17	5.74	2.79
34	9.53	4.90	2.38	10.84	5.57	2.71
35	9.26	4.76	2.31	10.53	5.41	2.63
36	9.00	4.63	2.25	10.24	5.26	2.56
37	8.76	4.50	2.19	9.97	5.12	2.49
38	8.53	4.38	2.13	9.70	4.99	2.43
39	8.31	4.27	2.08	9.45	4.86	2.36
40	8.10	4.16	2.03	9.22	4.74	2.30
41	7.90	4.06	1.98	8.99	4.62	2.25
42	7.72	3.96	1.93	8.78	4.51	2.19
43	7.54	3.87	1.89	8.57	4.41	2.14
44	7.36	3.78	1.84	8.38	4.31	2.10
45	7.20	3.70	1.80	8.19	4.21	2.05
46	7.04	3.62	1.78	8.02	4.12	2.00
48	6.75	3.47	1.69	7.68	3.95	1.92
50	6.48	3.33	1.62	7.37	3.79	1.84
52	6.23	3.20	1.56	7.09	3.64	1.77
54	6.00	3.08	1.50	6.83	3.61	1.71
56	5.79	2.97	1.45	6.58	3.38	1.65
58	5.59	2.87	1.40	6.36	3.27	1.59
60	5.40	2.78	1.35	6.15	3.16	1.54
64	5.06	2.60	1.27	5.76	2.96	1.44
68	4.77	2.45	1.19	5.42	2.79	1.36
72	4.50	2.31	1.13	5.12	2.63	1.28
76	4.26	2.19	1.07	4.85	2.49	1.21
80	4.05	2.08	1.01	4.61	2.37	1.15
84	3.86	1.98	.96	4.39	2.26	1.10
88	3.68	1.89	.92	4.19	2.15	1.05



### Tape Drive Twisting Frame Twist Gearing

*Formula for figuring twist:*

C = Cylinder Gear.

S = Stud Gear.

T = Change Gear

$$\frac{F \times S \times R}{C \times T \times D} = \text{Twist per inch.}$$

$$\frac{\text{Twist Constant}}{\text{Change Gear}} = \text{Twist per inch.}$$

F = Front Roll Gear.

R = Ratio Whirl to Cylinder.

D = Circumference of Front Roll.

$$\frac{F \times S \times R}{C \times D} = \text{Twist Constant.}$$

$$\frac{\text{Twist Constant}}{\text{Twist per inch.}} = \text{Change Gear.}$$

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# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	76.14	56.02	47.53	39.05	22.07
16	71.38	52.52	44.56	36.61	20.69
17	67.18	49.43	41.94	34.45	19.47
18	63.45	46.69	39.61	32.54	18.39
19	60.11	44.23	37.53	30.83	17.42
20	57.10	42.02	35.66	29.28	16.55
21	54.39	40.02	33.95	27.89	15.76
22	51.91	38.20	32.41	26.62	15.05
23	49.66	36.54	31.00	25.46	14.39
24	47.58	35.01	29.71	24.40	13.79
25	45.68	33.61	28.52	23.43	13.24
26	43.93	32.32	27.42	22.53	12.73
27	42.30	31.12	26.41	21.69	12.26
28	40.79	30.01	25.46	20.92	11.82
29	39.38	28.98	24.59	20.20	11.42
30	38.07	28.01	23.77	19.52	11.04
31	36.84	27.11	23.00	18.89	10.68
32	35.69	26.26	22.28	18.30	10.35
33	34.61	25.46	21.61	17.75	10.03
34	33.59	24.71	20.97	17.23	9.74
35	32.63	24.01	20.37	16.73	9.46
36	31.72	23.34	19.81	16.27	9.20
37	30.87	22.71	19.27	15.83	8.95
38	30.06	22.11	18.76	15.41	8.71
39	29.28	21.55	18.28	15.02	8.49
40	28.55	21.01	17.83	14.64	8.28
41	27.86	20.50	17.39	14.28	8.07
42	27.19	20.01	16.98	13.94	7.88
43	26.56	19.54	16.58	13.62	7.70
44	25.96	19.10	16.20	13.31	7.52
45	25.38	18.67	15.84	13.02	7.36
46	24.83	18.27	15.50	12.73	7.20
47	24.30	17.88	15.17	12.46	7.04
48	23.79	17.51	14.85	12.20	6.90
49	23.31	17.15	14.55	11.95	6.76
50	22.84	16.81	14.26	11.71	6.62
51	22.39	16.48	13.98	11.48	6.49
52	21.96	16.16	13.71	11.26	6.37
53	21.55	15.86	13.45	11.05	6.25
54	21.15	15.56	13.20	10.85	6.13
55	20.77	15.28	12.96	10.65	6.02
56	20.39	15.01	12.73	10.46	5.91
57	20.04	14.74	12.51	10.28	5.81
58	19.69	14.49	12.29	10.10	5.71
Const's	1142.09	840.34	713.00	585.68	331.05

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	19.36	14.24	12.08	9.93	5.61
60	19.03	14.01	11.88	9.76	5.52
61	18.72	13.78	11.69	9.60	5.43
62	18.42	13.55	11.50	9.45	5.34
63	18.13	13.34	11.32	9.30	5.25
64	17.85	13.13	11.14	9.15	5.17
65	17.57	12.93	10.97	9.01	5.09
66	17.30	12.73	10.80	8.87	5.02
67	17.05	12.54	10.64	8.74	4.94
68	16.80	12.36	10.49	8.61	4.87
69	16.55	12.18	10.33	8.49	4.80
70	16.32	12.00	10.19	8.37	4.73
71	16.09	11.84	10.04	8.25	4.66
72	15.86	11.67	9.90	8.13	4.60
73	15.65	11.51	9.77	8.02	4.54
74	15.43	11.36	9.64	7.91	4.47
75	15.23	11.20	9.51	7.81	4.41
76	15.03	11.06	9.38	7.71	4.36
77	14.83	10.91	9.26	7.61	4.30
78	14.64	10.77	9.14	7.51	4.24
79	14.46	10.64	9.03	7.41	4.19
80	14.28	10.50	8.91	7.32	4.14
81	14.10	10.37	8.80	7.23	4.09
82	13.93	10.25	8.70	7.14	4.04
83	13.76	10.12	8.59	7.06	3.99
84	13.60	10.00	8.49	6.97	3.94
85	13.44	9.89	8.39	6.89	3.89
86	13.28	9.77	8.29	6.81	3.85
87	13.13	9.66	8.20	6.73	3.81
88	12.98	9.55	8.10	6.66	3.76
89	12.83	9.44	8.01	6.58	3.72
90	12.69	9.34	7.92	6.51	3.68
91	12.55	9.23	7.84	6.44	3.64
92	12.41	9.13	7.76	6.37	3.60
93	12.28	9.04	7.67	6.30	3.56
94	12.15	8.94	7.59	6.23	3.52
96	11.90	8.75	7.43	6.10	3.45
98	11.65	8.57	7.28	5.98	3.38
100	11.42	8.40	7.13	5.86	3.31
102	11.20	8.24	6.99	5.74	3.25
104	10.98	8.08	6.86	5.63	3.18
106	10.77	7.93	6.73	5.53	3.12
108	10.57	7.78	6.60	5.42	3.07
110	10.38	7.64	6.48	5.32	3.01
Const's	1142.09	840.34	713.00	585.68	331.05

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 7 inches Diameter  
Whirl  $\frac{15}{16}$  inches Diameter

Ratio Cylinder to Whirl 1 to 7.27  
Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	70.96	52.22	44.30	36.39	20.57
16	66.53	48.95	41.54	34.12	19.28
17	62.62	46.07	39.09	32.11	18.15
18	59.14	43.51	36.92	30.33	17.14
19	56.03	41.22	34.98	28.73	16.24
20	53.23	39.16	33.23	27.29	15.43
21	50.69	37.30	31.65	25.99	14.69
22	48.39	35.60	30.21	24.81	14.02
23	46.28	34.05	28.89	23.73	13.41
24	44.35	32.63	27.69	22.75	12.86
25	42.58	31.33	26.58	21.84	12.34
26	40.94	30.12	25.56	21.00	11.87
27	39.43	29.01	24.61	20.22	11.43
28	38.02	27.97	23.73	19.50	11.02
29	36.71	27.01	22.92	18.82	10.64
30	35.48	26.11	22.15	18.20	10.29
31	34.34	25.27	21.44	17.61	9.95
32	33.26	24.48	20.77	17.06	9.64
33	32.26	23.73	20.14	16.54	9.35
34	31.31	23.04	19.55	16.06	9.07
35	30.41	22.38	18.99	15.60	8.81
36	29.57	21.76	18.46	15.16	8.57
37	28.77	21.17	17.96	14.75	8.34
38	28.01	20.61	17.49	14.37	8.12
39	27.29	20.08	17.04	14.00	7.91
40	26.61	19.58	16.61	13.65	7.71
41	25.96	19.10	16.21	13.31	7.53
42	25.35	18.65	15.82	13.00	7.34
43	24.75	18.21	15.45	12.70	7.18
44	24.19	17.80	15.10	12.41	7.01
45	23.65	17.42	14.77	12.13	6.86
46	23.14	17.03	14.45	11.87	6.71
47	22.65	16.66	14.14	11.61	6.56
48	22.18	16.32	13.85	11.37	6.43
49	21.72	15.98	13.56	11.14	6.30
50	21.29	15.67	13.29	10.92	6.17
51	20.87	15.36	13.03	10.70	6.05
52	20.47	15.06	12.78	10.52	5.93
53	20.08	14.78	12.54	10.30	5.82
54	19.71	14.50	12.31	10.11	5.71
55	19.35	14.24	12.08	9.92	5.61
56	19.01	13.99	11.87	9.75	5.51
57	18.70	13.74	11.66	9.58	5.41
58	18.35	13.50	11.46	9.41	5.32
Const's	1064.49	783.23	664.56	545.89	308.54

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 7.27

Whirl  $\frac{15}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	18.04	13.28	11.26	9.25	5.23
60	17.74	13.05	11.08	9.07	5.14
61	17.45	12.84	10.89	8.95	5.06
62	17.17	12.63	10.72	8.80	4.98
63	16.90	12.43	10.55	8.66	4.89
64	16.63	12.24	10.38	8.53	4.82
65	16.38	12.05	10.22	8.40	4.75
66	16.13	11.87	10.07	8.27	4.67
67	15.89	11.69	9.92	8.15	4.61
68	15.65	11.52	9.77	8.03	4.54
69	15.43	11.35	9.63	7.91	4.47
70	15.21	11.19	9.49	7.80	4.41
71	14.99	11.03	9.36	7.69	4.35
72	14.78	10.88	9.23	7.58	4.29
73	14.58	10.73	9.10	7.48	4.23
74	14.39	10.58	8.98	7.38	4.17
75	14.19	10.44	8.86	7.28	4.11
76	14.01	10.31	8.74	7.18	4.06
77	13.82	10.17	8.63	7.09	4.01
78	13.65	10.04	8.52	7.00	3.96
79	13.47	9.91	8.41	6.91	3.91
80	13.31	9.79	8.31	6.82	3.86
81	13.14	9.67	8.20	6.74	3.81
82	12.98	9.55	8.10	6.66	3.76
83	12.83	9.44	8.00	6.58	3.72
84	12.67	9.32	7.91	6.50	3.67
85	12.52	9.21	7.82	6.42	3.63
86	12.38	9.11	7.73	6.35	3.59
87	12.24	9.00	7.64	6.27	3.55
88	12.10	8.90	7.55	6.20	3.51
89	11.96	8.80	7.47	6.13	3.47
90	11.83	8.70	7.38	6.07	3.43
91	11.70	8.61	7.30	6.00	3.39
92	11.57	8.51	7.22	5.93	3.35
93	11.45	8.42	7.15	5.87	3.32
94	11.33	8.33	7.07	5.81	3.28
96	11.00	8.16	6.92	5.69	3.21
98	10.86	7.99	6.78	5.57	3.15
100	10.64	7.83	6.65	5.46	3.09
102	10.44	7.68	6.51	5.35	3.02
104	10.24	7.53	6.39	5.25	2.97
106	10.04	7.39	6.27	5.15	2.91
108	9.86	7.25	6.15	5.05	2.86
110	9.68	7.12	6.04	4.96	2.80
Const's	1064.49	783.23	664.56	545.89	308.54



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.81

Whirl 1 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	66.48	48.91	41.50	34.09	19.27
16	62.32	45.85	38.91	31.96	18.06
17	58.65	43.16	36.62	30.08	17.00
18	55.40	40.75	34.58	28.41	16.06
19	52.48	38.61	32.76	26.91	15.21
20	49.86	36.68	31.13	25.57	14.45
21	47.48	34.93	29.64	24.35	13.76
22	45.32	33.35	28.30	23.24	13.14
23	43.35	31.90	27.07	22.23	12.57
24	41.55	30.57	25.94	21.31	12.04
25	39.89	29.35	24.90	20.45	11.56
26	38.35	28.22	23.94	19.67	11.12
27	36.93	27.17	23.06	18.94	10.70
28	35.61	26.20	22.23	18.26	10.32
29	34.38	25.30	21.47	17.63	9.96
30	33.24	24.46	20.75	17.05	9.63
31	32.17	23.67	20.08	16.50	9.32
32	31.16	22.93	19.45	15.98	9.03
33	30.22	22.23	18.86	15.50	8.76
34	29.32	21.58	18.31	15.04	8.50
35	28.49	20.96	17.79	14.61	8.26
36	27.70	20.38	17.29	14.20	8.02
37	26.95	19.83	16.82	13.82	7.81
38	26.24	19.31	16.38	13.46	7.61
39	25.57	18.81	15.96	13.11	7.41
40	24.93	18.34	15.56	12.78	7.23
41	24.32	17.89	15.18	12.47	7.05
42	23.74	17.47	14.82	12.18	6.88
43	23.19	17.06	14.48	11.89	6.72
44	22.66	16.67	14.15	11.62	6.57
45	22.16	16.30	13.83	11.36	6.42
46	21.68	15.95	13.53	11.12	6.28
47	21.22	15.61	13.24	10.88	6.15
48	20.77	15.28	12.97	10.65	6.02
49	20.35	14.97	12.70	10.44	5.90
50	19.94	14.67	12.45	10.22	5.78
51	19.55	14.39	12.21	10.02	5.67
52	19.18	14.11	11.97	9.83	5.56
53	18.81	13.84	11.75	9.65	5.45
54	18.47	13.58	11.53	9.47	5.35
55	18.13	13.33	11.32	9.30	5.26
56	17.81	13.10	11.12	9.13	5.16
57	17.49	12.87	10.92	8.97	5.07
58	17.19	12.64	10.73	8.82	4.98
Const's	997.13	733.67	622.51	511.35	289.02

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.81

Whirl 1 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	16.90	12.44	10.55	8.67	4.90
60	16.62	12.23	10.38	8.52	4.82
61	16.35	12.03	10.21	8.38	4.74
62	16.08	11.83	10.04	8.25	4.66
63	15.83	11.65	9.88	8.12	4.59
64	15.58	11.46	9.73	7.99	4.52
65	15.34	11.29	9.57	7.87	4.45
66	15.11	11.12	9.43	7.75	4.38
67	14.88	10.95	9.29	7.63	4.31
68	14.66	10.79	9.15	7.52	4.25
69	14.45	10.63	9.02	7.41	4.19
70	14.24	10.48	8.89	7.31	4.13
71	14.04	10.33	8.77	7.20	4.07
72	13.85	10.19	8.65	7.10	4.01
73	13.66	10.05	8.53	7.00	3.96
74	13.47	9.91	8.41	6.91	3.91
75	13.30	9.78	8.30	6.82	3.85
76	13.12	9.65	8.19	6.73	3.80
77	12.95	9.53	8.08	6.64	3.75
78	12.78	9.41	7.98	6.56	3.71
79	12.62	9.29	7.88	6.47	3.66
80	12.46	9.17	7.78	6.39	3.61
81	12.31	9.04	7.69	6.31	3.57
82	12.16	8.95	7.59	6.24	3.52
83	12.01	8.84	7.50	6.16	3.48
84	11.87	8.73	7.41	6.09	3.44
85	11.73	8.63	7.32	6.02	3.40
86	11.59	8.53	7.24	5.95	3.36
87	11.46	8.43	7.16	5.88	3.32
88	11.33	8.34	7.07	5.81	3.28
89	11.20	8.24	6.99	5.75	3.25
90	11.08	8.15	6.92	5.68	3.21
91	10.96	8.06	6.84	5.62	3.18
92	10.84	7.97	6.77	5.56	3.14
93	10.72	7.89	6.69	5.50	3.11
94	10.61	7.81	6.62	5.44	3.07
96	10.39	7.64	6.48	5.33	3.01
98	10.17	7.49	6.35	5.22	2.95
100	9.97	7.34	6.22	5.11	2.89
102	9.78	7.19	6.10	5.01	2.83
104	9.59	7.05	5.99	4.92	2.78
106	9.41	6.92	5.87	4.82	2.73
108	9.23	6.79	5.76	4.73	2.68
110	9.06	6.67	5.66	4.65	2.63
Const's	997.13	733.67	622.51	511.35	289.02

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.43

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	62.77	46.18	39.19	32.19	18.19
16	58.84	43.30	36.74	30.18	17.06
17	55.38	40.75	34.57	28.40	16.05
18	52.31	38.49	32.65	26.82	15.16
19	49.55	36.46	30.94	25.41	14.36
20	47.07	34.64	29.39	24.14	13.65
21	44.83	32.99	27.99	22.99	13.00
22	42.80	31.49	26.72	21.95	12.40
23	40.93	30.12	25.56	20.99	11.87
24	39.23	28.86	24.49	20.12	11.37
25	37.66	27.71	23.51	19.31	10.92
26	36.21	26.64	22.61	18.57	10.50
27	34.87	25.66	21.77	17.88	10.11
28	33.63	24.74	20.99	17.24	9.75
29	32.47	23.89	20.27	16.65	9.41
30	31.38	23.09	19.59	16.09	9.10
31	30.37	22.35	18.96	15.57	8.80
32	29.42	21.65	18.37	15.09	8.53
33	28.53	20.99	17.81	14.63	8.27
34	27.69	20.37	17.26	14.20	8.03
35	26.90	19.79	16.79	13.79	7.80
36	26.15	19.24	16.33	13.41	7.58
37	25.45	18.72	15.89	13.05	7.38
38	24.78	18.23	15.47	12.71	7.18
39	24.14	17.76	15.07	12.38	7.00
40	23.54	17.32	14.69	12.07	6.82
41	22.96	16.90	14.34	11.78	6.66
42	22.46	16.50	13.99	11.50	6.50
43	21.90	16.11	13.67	11.23	6.35
44	21.40	15.74	13.36	10.97	6.20
45	20.92	15.39	13.06	10.73	6.06
46	20.47	15.06	12.78	10.50	5.93
47	20.03	14.74	12.51	10.27	5.81
48	19.61	14.44	12.25	10.06	5.69
49	19.21	14.14	12.00	9.85	5.57
50	18.83	13.85	11.75	9.66	5.46
51	18.46	13.58	11.53	9.47	5.35
52	18.11	13.32	11.30	9.29	5.25
53	17.77	13.07	11.09	9.11	5.15
54	17.44	12.83	10.89	8.94	5.05
55	17.12	12.60	10.69	8.78	4.96
56	16.81	12.37	10.50	8.62	4.87
57	16.52	12.15	10.31	8.47	4.79
58	16.23	11.94	10.13	8.32	4.71
Const's	941.49	692.73	587.77	482.81	272.90

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.43

Whirl  $1\frac{1}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	15.95	11.74	9.96	8.18	4.63
60	15.69	11.55	9.80	8.05	4.55
61	15.43	11.36	9.64	7.91	4.47
62	15.18	11.17	9.48	7.79	4.40
63	14.94	11.00	9.33	7.66	4.33
64	14.71	10.82	9.18	7.54	4.26
65	14.49	10.66	9.04	7.43	4.20
66	14.27	10.50	8.91	7.32	4.14
67	14.05	10.34	8.78	7.21	4.07
68	13.84	10.19	8.64	7.10	4.01
69	13.64	10.04	8.52	7.00	3.96
70	13.45	9.90	8.40	6.90	3.90
71	13.26	9.76	8.28	6.80	3.84
72	13.07	9.62	8.16	6.71	3.79
73	12.90	9.49	8.05	6.61	3.74
74	12.73	9.36	7.94	6.53	3.69
75	12.55	9.24	7.83	6.44	3.64
76	12.39	9.12	7.73	6.35	3.59
77	12.23	9.00	7.63	6.27	3.54
78	12.07	8.88	7.54	6.19	3.50
79	11.92	8.77	7.44	6.11	3.45
80	11.77	8.66	7.35	6.04	3.41
81	11.62	8.55	7.26	5.96	3.37
82	11.48	8.45	7.17	5.89	3.33
83	11.34	8.35	7.08	5.82	3.29
84	11.21	8.25	7.00	5.75	3.25
85	11.08	8.15	6.92	5.68	3.21
86	10.95	8.06	6.83	5.61	3.17
87	10.82	7.96	6.76	5.55	3.14
88	10.70	7.87	6.68	5.49	3.10
89	10.58	7.78	6.60	5.43	3.07
90	10.46	7.70	6.53	5.36	3.03
91	10.35	7.61	6.46	5.31	3.00
92	10.23	7.53	6.39	5.25	2.97
93	10.12	7.45	6.32	5.19	2.93
94	10.02	7.37	6.25	5.14	2.90
96	9.81	7.22	6.12	5.03	2.84
98	9.61	7.07	6.00	4.93	2.78
100	9.41	6.93	5.88	4.83	2.73
102	9.23	6.80	5.76	4.73	2.68
104	9.05	6.66	5.65	4.64	2.62
106	8.88	6.54	5.55	4.56	2.57
108	8.72	6.41	5.44	4.47	2.53
110	8.56	6.30	5.34	4.39	2.48
Const's	941.49	692.73	587.77	482.81	272.90

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.09

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	59.45	43.74	37.11	30.49	17.23
16	55.73	41.01	34.79	28.58	16.15
17	52.45	38.59	32.75	26.90	15.20
18	49.54	36.45	30.93	25.41	14.36
19	46.93	34.53	29.30	24.18	13.60
20	44.59	32.81	27.83	22.87	12.92
21	42.46	31.24	26.51	21.78	12.31
22	40.53	29.82	25.30	20.79	11.75
23	38.77	28.53	24.20	19.88	11.24
24	37.15	27.34	23.20	19.06	10.77
25	35.66	26.24	22.27	18.29	10.34
26	34.29	25.23	21.41	17.59	9.94
27	33.03	24.30	20.62	16.94	9.57
28	31.85	23.43	19.88	16.33	9.23
29	30.75	22.62	19.20	15.77	8.91
30	29.72	21.87	18.56	15.24	8.62
31	28.76	21.16	17.96	14.75	8.34
32	27.87	20.50	17.40	14.29	8.08
33	27.02	19.88	16.87	13.86	7.83
34	26.23	19.30	16.37	13.45	7.60
35	25.48	18.75	15.91	13.07	7.38
36	24.77	18.23	15.46	12.70	7.18
37	24.10	17.73	15.05	12.36	6.99
38	23.47	17.27	14.65	12.04	6.80
39	22.86	16.82	14.27	11.73	6.63
40	22.29	16.40	13.92	11.43	6.46
41	21.75	16.00	13.58	11.15	6.30
42	21.23	15.62	13.25	10.89	6.15
43	20.74	15.26	12.95	10.64	6.01
44	20.27	14.91	12.65	10.39	5.87
45	19.82	14.59	12.37	10.16	5.74
46	19.39	14.26	12.10	9.94	5.62
47	18.97	13.96	11.84	9.73	5.50
48	18.58	13.67	11.60	9.53	5.38
49	18.20	13.39	11.36	9.33	5.27
50	17.83	13.12	11.13	9.15	5.17
51	17.48	12.86	10.92	8.97	5.07
52	17.15	12.62	10.71	8.79	4.97
53	16.82	12.38	10.50	8.63	4.88
54	16.51	12.15	10.31	8.47	4.79
55	16.21	11.92	10.12	8.32	4.70
56	15.92	11.72	9.94	8.17	4.62
57	15.64	11.51	9.77	8.02	4.53
58	15.37	11.31	9.60	7.89	4.46
Const's	891.71	656.10	556.69	457.33	258.46

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 6.09

Whirl  $1\frac{1}{3}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	15.11	11.12	9.44	7.75	4.38
60	14.86	10.94	9.28	7.62	4.31
61	14.62	10.76	9.13	7.50	4.24
62	14.38	10.58	8.98	7.38	4.17
63	14.15	10.41	8.84	7.26	4.10
64	13.93	10.25	8.70	7.15	4.04
65	13.72	10.09	8.56	7.04	3.98
66	13.51	9.94	8.43	6.93	3.92
67	13.31	9.79	8.31	6.83	3.86
68	13.11	9.65	8.19	6.73	3.80
69	12.92	9.51	8.07	6.63	3.75
70	12.74	9.37	7.95	6.53	3.69
71	12.56	9.24	7.84	6.44	3.64
72	12.38	9.11	7.73	6.35	3.59
73	12.22	8.99	7.63	6.26	3.54
74	12.05	8.86	7.52	6.18	3.49
75	11.89	8.75	7.42	6.10	3.45
76	11.73	8.63	7.32	6.02	3.40
77	11.58	8.52	7.23	5.94	3.36
78	11.43	8.41	7.14	5.86	3.31
79	11.29	8.31	7.05	5.79	3.27
80	11.15	8.20	6.96	5.72	3.23
81	11.01	8.10	6.87	5.65	3.19
82	10.87	8.00	6.79	5.58	3.15
83	10.74	7.90	6.71	5.51	3.11
84	10.62	7.81	6.63	5.44	3.08
85	10.49	7.71	6.55	5.38	3.04
86	10.37	7.63	6.47	5.32	3.01
87	10.25	7.54	6.40	5.26	2.97
88	10.13	7.46	6.33	5.20	2.94
89	10.02	7.37	6.25	5.14	2.90
90	9.91	7.29	6.18	5.08	2.87
91	9.80	7.21	6.12	5.03	2.84
92	9.69	7.13	6.05	4.97	2.81
93	9.60	7.05	5.99	4.92	2.78
94	9.49	6.98	5.92	4.87	2.75
96	9.29	6.83	5.80	4.76	2.69
98	9.10	6.69	5.68	4.67	2.64
100	8.92	6.56	5.57	4.57	2.58
102	8.74	6.43	5.46	4.48	2.53
104	8.57	6.31	5.35	4.40	2.49
106	8.41	6.19	5.25	4.31	2.44
108	8.26	6.08	5.15	4.23	2.39
110	8.11	5.96	5.06	4.16	2.35
Const's	891.71	656.10	556.69	457.33	258.46

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 5.22

Whirl  $1\frac{5}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	50.95	37.49	31.81	26.13	14.77
16	47.77	35.15	29.82	24.50	13.84
17	44.96	33.08	28.07	23.06	13.03
18	42.46	31.24	26.51	21.78	12.31
19	40.23	29.60	25.11	20.63	11.66
20	38.22	28.12	23.86	19.60	11.08
21	36.40	26.78	22.72	18.66	10.55
22	34.74	25.56	21.69	17.82	10.07
23	33.23	24.45	20.75	17.04	9.63
24	31.85	23.43	19.88	16.33	9.23
25	30.57	22.50	19.09	15.68	8.86
26	29.40	21.63	18.35	15.08	8.52
27	28.31	20.83	17.67	14.52	8.20
28	27.30	20.09	17.04	14.00	7.91
29	26.36	19.39	16.45	13.52	7.64
30	25.48	18.75	15.91	13.07	7.39
31	24.66	18.14	15.39	12.64	7.14
32	23.89	17.57	14.91	12.25	6.92
33	23.46	17.04	14.46	11.88	6.71
34	22.48	16.54	14.04	11.53	6.51
35	21.84	16.06	13.63	11.20	6.33
36	21.23	15.62	13.25	10.89	6.15
37	20.66	15.20	12.90	10.59	5.99
38	20.11	14.80	12.56	10.31	5.83
39	19.60	14.42	12.23	10.05	5.68
40	19.11	14.06	11.93	9.80	5.54
41	18.64	13.72	11.64	9.56	5.40
42	18.20	13.39	11.36	9.33	5.27
43	17.77	13.08	11.10	9.12	5.15
44	17.37	12.78	10.84	8.91	5.04
45	16.98	12.50	10.60	8.71	4.92
46	16.62	12.23	10.37	8.52	4.82
47	16.26	11.97	10.15	8.34	4.71
48	15.92	11.72	9.94	8.17	4.62
49	15.60	11.48	9.74	8.00	4.52
50	15.29	11.25	9.54	7.84	4.43
51	14.99	11.03	9.36	7.69	4.34
52	14.70	10.82	9.18	7.54	4.26
53	14.42	10.61	9.00	7.40	4.18
54	14.15	10.41	8.84	7.26	4.10
55	13.90	10.23	8.67	7.13	4.03
56	13.65	10.04	8.52	7.00	3.96
57	13.41	9.87	8.37	6.88	3.89
58	13.17	9.70	8.23	6.76	3.82
Const's	764.32	562.38	477.16	391.96	221.54



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 5.22

Whirl  $1\frac{5}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	12.93	9.53	8.09	6.64	3.76
60	12.74	9.37	7.95	6.53	3.69
61	12.53	9.22	7.82	6.43	3.63
62	12.33	9.07	7.70	6.32	3.57
63	12.13	8.93	7.57	6.22	3.51
64	11.94	8.79	7.46	6.12	3.46
65	11.76	8.65	7.34	6.03	3.40
66	11.58	8.52	7.23	5.94	3.36
67	11.41	8.39	7.12	5.85	3.31
68	11.24	8.27	7.01	5.76	3.26
69	11.08	8.15	6.91	5.68	3.21
70	10.92	8.03	6.82	5.60	3.17
71	10.77	7.92	6.72	5.52	3.12
72	10.62	7.81	6.63	5.44	3.08
73	10.47	7.70	6.54	5.37	3.03
74	10.33	7.60	6.45	5.30	2.99
75	10.19	7.50	6.36	5.23	2.95
76	10.06	7.40	6.28	5.16	2.91
77	9.93	7.30	6.20	5.09	2.88
78	9.80	7.21	6.12	5.03	2.84
79	9.67	7.12	6.04	4.96	2.80
80	9.58	7.03	5.96	4.90	2.77
81	9.44	6.94	5.89	4.84	2.74
82	9.32	6.86	5.82	4.78	2.70
83	9.21	6.78	5.75	4.72	2.67
84	9.10	6.70	5.68	4.67	2.64
85	8.99	6.62	5.61	4.61	2.61
86	8.89	6.54	5.55	4.56	2.58
87	8.79	6.46	5.49	4.51	2.55
88	8.69	6.39	5.42	4.45	2.52
89	8.59	6.32	5.36	4.40	2.49
90	8.49	6.25	5.30	4.36	2.46
91	8.40	6.18	5.24	4.31	2.43
92	8.31	6.11	5.19	4.26	2.41
93	8.21	6.04	5.13	4.21	2.38
94	8.13	5.98	5.08	4.17	2.36
96	7.96	5.86	4.97	4.08	2.31
98	7.80	5.74	4.87	4.00	2.26
100	7.64	5.62	4.77	3.92	2.22
102	7.49	5.52	4.68	3.84	2.17
104	7.35	5.42	4.59	3.77	2.13
106	7.21	5.32	4.50	3.70	2.09
108	7.08	5.21	4.42	3.63	2.05
110	6.95	5.11	4.34	3.56	2.01
Const's	764.32	562.38	477.16	391.96	221.54

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 4.20

Whirl  $1\frac{5}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	41.00	30.17	25.59	21.02	11.88
16	38.44	28.28	24.00	19.71	11.14
17	36.17	26.62	22.58	18.55	10.49
18	34.17	25.14	21.33	17.52	9.90
19	32.37	23.81	20.21	16.60	9.38
20	30.75	22.62	19.20	15.77	8.91
21	29.28	21.55	18.28	15.02	8.49
22	27.95	20.57	17.45	14.34	8.10
23	26.74	19.67	16.69	13.71	7.76
24	25.62	18.85	16.00	13.14	7.43
25	24.60	18.10	15.36	12.61	7.13
26	23.65	17.40	14.77	12.13	6.86
27	22.78	16.76	14.22	11.68	6.60
28	21.96	16.16	13.71	11.26	6.37
29	21.21	15.60	13.24	10.87	6.15
30	20.50	15.08	12.80	10.51	5.94
31	19.84	14.60	12.38	10.17	5.75
32	19.22	14.14	12.00	9.86	5.57
33	18.64	13.71	11.63	9.56	5.40
34	18.09	13.31	11.29	9.28	5.24
35	17.57	12.93	10.97	9.01	5.09
36	17.08	12.57	10.66	8.76	4.95
37	16.62	12.23	10.38	8.52	4.82
38	16.18	11.91	10.10	8.30	4.69
39	15.77	11.60	9.84	8.09	4.57
40	15.37	11.31	9.60	7.88	4.46
41	15.00	11.04	9.36	7.69	4.35
42	14.64	10.77	9.14	7.51	4.24
43	14.30	10.52	8.93	7.33	4.15
44	13.98	10.28	8.73	7.17	4.05
45	13.67	10.06	8.53	7.01	3.96
46	13.37	9.84	8.35	6.86	3.88
47	13.08	9.63	8.17	6.71	3.79
48	12.81	9.43	8.00	6.57	3.71
49	12.55	9.23	7.84	6.44	3.64
50	12.30	9.05	7.68	6.31	3.57
51	12.06	8.87	7.53	6.18	3.50
52	11.83	8.70	7.38	6.06	3.43
53	11.60	8.54	7.24	5.95	3.36
54	11.39	8.38	7.11	5.84	3.30
55	11.18	8.23	6.98	5.73	3.24
56	10.98	8.08	6.86	5.63	3.18
57	10.79	7.94	6.74	5.53	3.13
58	10.60	7.80	6.62	5.44	3.07
Const's	614.97	452.48	383.92	315.37	178.25

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 4.20

Whirl 1  $\frac{5}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	10.42	7.67	6.51	5.35	3.02
60	10.25	7.54	6.40	5.26	2.97
61	10.08	7.42	6.29	5.17	2.92
62	9.92	7.30	6.19	5.09	2.88
63	9.76	7.18	6.09	5.01	2.83
64	9.61	7.07	6.00	4.93	2.79
65	9.46	6.96	5.91	4.85	2.74
66	9.32	6.86	5.82	4.78	2.70
67	9.18	6.75	5.73	4.71	2.66
68	9.04	6.65	5.65	4.64	2.62
69	8.91	6.56	5.56	4.57	2.58
70	8.79	6.46	5.48	4.51	2.55
71	8.66	6.37	5.41	4.44	2.51
72	8.54	6.28	5.33	4.38	2.48
73	8.42	6.20	5.26	4.32	2.44
74	8.31	6.11	5.19	4.26	2.41
75	8.20	6.03	5.12	4.20	2.38
76	8.09	5.95	5.05	4.15	2.35
77	7.99	5.88	4.99	4.10	2.31
78	7.88	5.80	4.92	4.04	2.29
79	7.78	5.73	4.86	3.99	2.26
80	7.69	5.66	4.80	3.94	2.23
81	7.59	5.59	4.74	3.89	2.20
82	7.50	5.52	4.68	3.84	2.17
83	7.40	5.45	4.63	3.80	2.15
84	7.32	5.39	4.57	3.75	2.12
85	7.23	5.32	4.52	3.71	2.10
86	7.15	5.26	4.46	3.67	2.07
87	7.07	5.20	4.41	3.62	2.05
88	6.99	5.14	4.36	3.58	2.03
89	6.92	5.08	4.31	3.54	2.00
90	6.83	5.03	4.27	3.50	1.98
91	6.76	4.97	4.22	3.47	1.96
92	6.68	4.92	4.17	3.43	1.94
93	6.61	4.87	4.13	3.39	1.92
94	6.54	4.81	4.08	3.36	1.90
96	6.41	4.71	4.00	3.29	1.86
98	6.28	4.62	3.92	3.22	1.82
100	6.15	4.52	3.84	3.15	1.78
102	6.03	4.44	3.76	3.09	1.75
104	5.91	4.35	3.69	3.03	1.71
106	5.80	4.27	3.62	2.98	1.68
108	5.69	4.19	3.55	2.92	1.65
110	5.59	4.11	3.49	2.87	1.62
Const's	614.97	452.48	383.92	315.37	178.25

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 3.93

Whirl  $1\frac{3}{4}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	38.36	28.22	23.95	19.67	11.12
16	35.96	26.45	22.45	18.44	10.42
17	33.85	24.90	21.13	17.36	9.81
18	31.96	23.52	19.96	16.39	9.26
19	30.29	22.28	18.91	15.53	8.78
20	28.77	21.17	17.96	14.76	8.34
21	27.40	20.16	17.11	14.05	7.94
22	26.16	19.24	16.33	13.41	7.58
23	25.02	18.40	15.62	12.83	7.25
24	23.98	17.64	14.97	12.30	6.95
25	23.02	16.93	14.37	11.80	6.67
26	22.13	16.28	13.82	11.35	6.41
27	21.31	15.68	13.31	10.93	6.18
28	20.55	15.12	12.83	10.54	5.96
29	19.84	14.60	12.39	10.18	5.75
30	19.18	14.11	11.98	9.84	5.56
31	18.56	13.66	11.59	9.52	5.38
32	17.98	13.23	11.23	9.22	5.21
33	17.44	12.83	10.89	8.94	5.05
34	16.92	12.45	10.57	8.68	4.91
35	16.44	12.09	10.26	8.43	4.77
36	15.98	11.76	9.98	8.20	4.63
37	15.55	11.44	9.71	7.98	4.51
38	15.14	11.14	9.45	7.77	4.39
39	14.75	10.85	9.21	7.57	4.28
40	14.39	10.58	8.98	7.38	4.17
41	14.04	10.33	8.76	7.20	4.07
42	13.70	10.08	8.55	7.03	3.97
43	13.38	9.84	8.35	6.86	3.88
44	13.08	9.62	8.16	6.71	3.79
45	12.79	9.41	7.98	6.56	3.71
46	12.51	9.20	7.81	6.42	3.63
47	12.24	9.01	7.64	6.28	3.55
48	11.99	8.82	7.48	6.15	3.47
49	11.74	8.64	7.33	6.02	3.40
50	11.51	8.47	7.19	5.90	3.33
51	11.28	8.30	7.04	5.79	3.27
52	11.07	8.14	6.91	5.68	3.21
53	10.86	7.99	6.78	5.57	3.15
54	10.66	7.84	6.65	5.46	3.08
55	10.46	7.70	6.53	5.36	3.03
56	10.28	7.56	6.42	5.27	2.98
57	10.10	7.43	6.30	5.18	2.93
58	9.92	7.30	6.19	5.09	2.88
Const's	575.44	423.31	359.24	295.10	166.78

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 3.93

Whirl 1¾ inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	9.75	7.17	6.09	5.00	2.83
60	9.59	7.06	5.99	4.92	2.78
61	9.43	6.94	5.89	4.84	2.73
62	9.28	6.83	5.79	4.76	2.69
63	9.13	6.72	5.70	4.68	2.64
64	8.99	6.61	5.61	4.61	2.61
65	8.85	6.51	5.53	4.54	2.57
66	8.72	6.41	5.44	4.47	2.52
67	8.59	6.31	5.36	4.40	2.49
68	8.46	6.23	5.28	4.34	2.45
69	8.34	6.13	5.21	4.28	2.42
70	8.22	6.05	5.13	4.22	2.38
71	8.10	5.96	5.06	4.16	2.35
72	7.99	5.88	4.99	4.10	2.32
73	7.88	5.80	4.92	4.04	2.28
74	7.78	5.72	4.85	3.99	2.25
75	7.67	5.64	4.78	3.93	2.22
76	7.57	5.57	4.73	3.88	2.20
77	7.47	5.50	4.67	3.83	2.17
78	7.38	5.43	4.61	3.78	2.14
79	7.28	5.36	4.55	3.74	2.11
80	7.19	5.29	4.49	3.69	2.08
81	7.10	5.23	4.44	3.64	2.06
82	7.02	5.16	4.38	3.60	2.03
83	6.93	5.10	4.33	3.56	2.01
84	6.85	5.04	4.28	3.51	1.99
85	6.77	4.98	4.23	3.47	1.96
86	6.69	4.92	4.18	3.43	1.94
87	6.61	4.87	4.12	3.39	1.92
88	6.54	4.81	4.08	3.35	1.90
89	6.47	4.76	4.04	3.32	1.87
90	6.39	4.70	3.99	3.28	1.85
91	6.32	4.65	3.95	3.24	1.83
92	6.25	4.60	3.90	3.21	1.81
93	6.19	4.55	3.86	3.17	1.79
94	6.12	4.50	3.81	3.14	1.77
96	5.99	4.41	3.74	3.07	1.74
98	5.87	4.32	3.67	3.01	1.70
100	5.75	4.23	3.59	2.95	1.66
102	5.64	4.15	3.52	2.89	1.64
104	5.53	4.07	3.45	2.84	1.60
106	5.43	3.99	3.39	2.78	1.57
108	5.33	3.92	3.33	2.73	1.54
110	5.23	3.85	3.27	2.68	1.52
Const's	575.44	423.31	359.24	295.10	166.78

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 3.51

Whirl 2 inches Diameter

Front Roll Gear 100 Teeth

Change	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
Gears	Twist	Twist	Twist	Twist	Twist
15	34.26	25.21	21.39	17.57	9.93
16	32.12	23.63	20.05	16.47	9.31
17	30.23	22.24	18.87	15.50	8.76
18	28.55	21.01	17.83	14.64	8.28
19	27.05	19.90	16.89	13.87	7.84
20	25.70	18.91	16.04	13.18	7.45
21	24.47	18.01	15.28	12.55	7.09
22	23.36	17.19	14.58	11.98	6.77
23	22.35	16.44	13.95	11.46	6.48
24	21.41	15.76	13.37	10.98	6.21
25	20.56	15.13	12.83	10.54	5.96
26	19.77	14.54	12.34	10.14	5.73
27	19.03	14.01	11.88	9.76	5.52
28	18.36	13.51	11.46	9.41	5.32
29	17.72	13.04	11.06	9.09	5.14
30	17.13	12.61	10.70	8.79	4.97
31	16.58	12.20	10.35	8.50	4.81
32	16.06	11.82	10.03	8.24	4.66
33	15.57	11.46	9.72	7.99	4.51
34	15.12	11.12	9.44	7.75	4.38
35	14.68	10.80	9.17	7.53	4.26
36	14.28	10.50	8.91	7.32	4.14
37	13.89	10.22	8.67	7.12	4.03
38	13.52	9.95	8.44	6.94	3.92
39	13.18	9.70	8.23	6.76	3.82
40	12.85	9.45	8.02	6.59	3.72
41	12.54	9.22	7.83	6.43	3.63
42	12.24	9.00	7.64	6.28	3.55
43	11.95	8.79	7.46	6.13	3.46
44	11.68	8.59	7.29	5.99	3.39
45	11.42	8.40	7.13	5.86	3.31
46	11.17	8.22	6.98	5.73	3.24
47	10.93	8.05	6.83	5.61	3.17
48	10.71	7.88	6.68	5.49	3.10
49	10.49	7.71	6.55	5.38	3.04
50	10.28	7.56	6.42	5.27	2.98
51	10.08	7.41	6.29	5.17	2.92
52	9.88	7.27	6.17	5.07	2.86
53	9.70	7.13	6.05	4.97	2.81
54	9.52	7.00	5.94	4.88	2.76
55	9.34	6.88	5.83	4.79	2.71
56	9.18	6.75	5.73	4.71	2.66
57	9.02	6.63	5.63	4.62	2.61
58	8.86	6.52	5.53	4.54	2.57
Const's	513.94	378.15	320.86	263.56	148.96

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 3.51

Whirl 2 inches Diameter

Front Roll Gear 100 Teeth

Change	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
Gears	Twist	Twist	Twist	Twist	Twist
59	8.71	6.41	5.44	4.47	2.52
60	8.57	6.30	5.35	4.39	2.48
61	8.43	6.20	5.26	4.32	2.44
62	8.29	6.10	5.18	4.25	2.40
63	8.16	6.00	5.09	4.18	2.36
64	8.03	5.91	5.01	4.12	2.33
65	7.91	5.82	4.94	4.05	2.29
66	7.79	5.73	4.86	3.99	2.26
67	7.67	5.64	4.79	3.93	2.22
68	7.56	5.56	4.72	3.88	2.19
69	7.45	5.48	4.65	3.82	2.16
70	7.34	5.40	4.58	3.77	2.13
71	7.23	5.33	4.52	3.71	2.10
72	7.14	5.25	4.46	3.66	2.07
73	7.04	5.18	4.40	3.62	2.04
74	6.94	5.11	4.34	3.56	2.01
75	6.85	5.04	4.28	3.51	1.99
76	6.76	4.98	4.22	3.47	1.96
77	6.67	4.91	4.17	3.42	1.93
78	6.59	4.85	4.11	3.38	1.91
79	6.51	4.79	4.06	3.34	1.89
80	6.42	4.73	4.01	3.29	1.86
81	6.34	4.67	3.96	3.25	1.84
82	6.27	4.61	3.91	3.21	1.82
83	6.19	4.56	3.87	3.18	1.79
84	6.12	4.50	3.82	3.14	1.77
85	6.05	4.45	3.77	3.10	1.75
86	5.98	4.40	3.73	3.06	1.73
87	5.91	4.35	3.69	3.03	1.71
88	5.84	4.30	3.65	3.00	1.69
89	5.77	4.25	3.61	2.96	1.67
90	5.71	4.20	3.57	2.93	1.66
91	5.65	4.16	3.53	2.90	1.64
92	5.59	4.11	3.49	2.87	1.62
93	5.53	4.07	3.45	2.83	1.60
94	5.47	4.02	3.41	2.80	1.58
96	5.35	3.94	3.34	2.74	1.55
98	5.24	3.86	3.27	2.69	1.50
100	5.14	3.78	3.21	2.64	1.47
102	5.04	3.71	3.15	2.58	1.45
104	4.94	3.64	3.09	2.53	1.42
106	4.85	3.57	3.03	2.49	1.39
108	4.76	3.50	2.97	2.44	1.37
110	4.67	3.44	2.92	2.40	1.35
Const's	513.94	378.15	320.86	263.56	148.96



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 2.76

Whirl  $2\frac{1}{2}$  inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	26.94	19.82	16.82	13.82	7.81
16	25.26	18.58	15.77	12.95	7.32
17	23.77	17.49	14.84	12.19	6.89
18	22.45	16.52	14.02	11.51	6.51
19	21.27	15.65	13.28	10.91	6.17
20	20.21	14.87	12.61	10.36	5.86
21	19.24	14.16	12.01	9.87	5.58
22	18.37	13.52	11.47	9.42	5.32
23	17.57	12.93	10.97	9.01	5.09
24	16.84	12.39	10.51	8.64	4.88
25	16.16	11.89	10.09	8.29	4.69
26	15.54	11.44	9.70	7.97	4.51
27	14.97	11.01	9.34	7.68	4.34
28	14.43	10.62	9.01	7.40	4.18
29	13.94	10.25	8.70	7.15	4.03
30	13.47	9.91	8.41	6.91	3.91
31	13.04	9.59	8.14	6.69	3.78
32	12.63	9.29	7.88	6.48	3.66
33	12.25	9.01	7.65	6.28	3.55
34	11.89	8.75	7.42	6.10	3.45
35	11.55	8.50	7.21	5.92	3.35
36	11.23	8.26	7.01	5.76	3.25
37	10.92	8.04	6.82	5.60	3.16
38	10.64	7.83	6.64	5.45	3.08
39	10.36	7.62	6.47	5.31	3.00
40	10.10	7.43	6.31	5.18	2.93
41	9.86	7.25	6.15	5.05	2.86
42	9.62	7.08	6.01	4.93	2.79
43	9.40	6.92	5.87	4.82	2.72
44	9.18	6.76	5.73	4.71	2.66
45	8.98	6.61	5.61	4.61	2.60
46	8.79	6.46	5.48	4.51	2.55
47	8.60	6.33	5.37	4.41	2.49
48	8.42	6.19	5.26	4.32	2.44
49	8.25	6.08	5.15	4.23	2.39
50	8.08	5.95	5.05	4.15	2.34
51	7.92	5.83	4.95	4.06	2.30
52	7.77	5.72	4.85	3.99	2.25
53	7.63	5.61	4.76	3.91	2.21
54	7.48	5.51	4.67	3.84	2.17
55	7.35	5.41	4.59	3.77	2.13
56	7.22	5.31	4.51	3.70	2.09
57	7.09	5.22	4.43	3.64	2.06
58	6.97	5.13	4.35	3.57	2.02
Const's	404.12	297.35	252.29	207.24	117.14

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 7 inches Diameter

Ratio Cylinder to Whirl 1 to 2.76

Whirl 2½ inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	6.85	5.04	4.28	3.51	1.99
60	6.74	4.96	4.21	3.45	1.95
61	6.63	4.87	4.14	3.40	1.92
62	6.52	4.80	4.07	3.34	1.89
63	6.42	4.72	4.00	3.29	1.86
64	6.31	4.65	3.94	3.24	1.83
65	6.22	4.57	3.88	3.19	1.80
66	6.12	4.51	3.82	3.14	1.77
67	6.03	4.44	3.77	3.09	1.75
68	5.94	4.37	3.71	3.05	1.72
69	5.86	4.31	3.65	3.00	1.70
70	5.77	4.25	3.60	2.96	1.67
71	5.69	4.19	3.55	2.92	1.65
72	5.61	4.13	3.50	2.88	1.63
73	5.54	4.07	3.46	2.84	1.60
74	5.46	4.02	3.41	2.80	1.58
75	5.39	3.96	3.36	2.76	1.56
76	5.32	3.91	3.32	2.73	1.54
77	5.25	3.86	3.28	2.69	1.52
78	5.18	3.81	3.23	2.66	1.50
79	5.12	3.76	3.19	2.62	1.48
80	5.05	3.72	3.15	2.59	1.46
81	4.99	3.67	3.11	2.56	1.45
82	4.93	3.63	3.08	2.53	1.43
83	4.87	3.58	3.04	2.50	1.41
84	4.81	3.54	3.00	2.47	1.39
85	4.75	3.50	2.97	2.43	1.38
86	4.70	3.46	2.93	2.41	1.36
87	4.65	3.42	2.90	2.38	1.35
88	4.59	3.38	2.87	2.36	1.33
89	4.54	3.34	2.83	2.33	1.32
90	4.49	3.30	2.80	2.30	1.30
91	4.44	3.27	2.77	2.28	1.29
92	4.39	3.23	2.74	2.25	1.27
93	4.35	3.20	2.71	2.23	1.26
94	4.30	3.16	2.68	2.20	1.25
96	4.21	3.10	2.63	2.16	1.22
98	4.12	3.03	2.57	2.11	1.20
100	4.04	2.97	2.52	2.07	1.17
102	3.96	2.91	2.47	2.03	1.15
104	3.88	2.86	2.43	1.99	1.13
106	3.81	2.80	2.38	1.96	1.10
108	3.74	2.75	2.34	1.92	1.08
110	3.67	2.70	2.29	1.88	1.06
Const's	404.12	297.35	252.29	207.24	117.14

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.80

Whirl  $\frac{7}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	85.90	63.20	53.65	44.05	24.89
16	80.53	59.25	50.27	41.29	23.34
17	75.76	55.77	47.32	38.87	21.97
18	71.58	52.67	44.69	36.71	20.75
19	67.82	49.89	42.34	34.78	19.66
20	64.43	47.40	40.22	33.04	18.67
21	61.36	45.14	38.31	31.46	17.78
22	58.57	43.09	36.56	30.13	16.98
23	56.03	41.22	34.97	28.73	16.24
24	53.69	39.50	33.52	27.53	15.56
25	51.54	37.96	32.18	26.43	14.94
26	49.56	36.47	30.94	25.41	14.36
27	47.73	35.11	29.79	24.47	13.83
28	46.02	33.86	28.73	23.59	13.34
29	44.43	32.69	27.74	22.78	12.88
30	42.95	31.60	26.82	22.02	12.45
31	41.56	30.58	25.95	21.31	12.04
32	40.26	29.63	25.13	20.64	11.67
33	39.05	28.73	24.38	20.03	11.32
34	37.89	27.88	23.66	19.43	10.98
35	36.81	27.09	22.98	18.88	10.67
36	35.79	26.34	22.34	18.35	10.37
37	34.82	25.62	21.74	17.86	10.09
38	33.91	24.94	21.17	17.39	9.83
39	33.04	24.31	20.63	16.94	9.58
40	32.21	23.70	20.11	16.52	9.32
41	31.43	23.12	19.64	16.11	9.18
42	30.68	22.52	19.15	15.73	8.89
43	29.96	22.05	18.71	15.36	8.68
44	29.28	21.54	18.28	15.01	8.49
45	28.63	21.06	17.88	14.68	8.29
46	28.01	20.61	17.48	14.36	8.12
47	27.42	20.17	17.12	14.06	7.94
48	26.84	19.75	16.76	13.76	7.73
49	26.29	19.35	16.42	13.48	7.62
50	25.77	18.98	16.09	13.21	7.47
51	25.27	18.59	15.77	12.95	7.32
52	24.78	18.23	15.47	12.70	7.18
53	24.31	17.84	15.18	12.47	7.05
54	23.86	17.55	14.89	12.23	6.91
55	23.43	17.23	14.63	12.01	6.79
56	23.01	16.93	14.36	11.79	6.67
57	22.61	16.63	14.11	11.59	6.55
58	22.22	16.34	13.87	11.39	6.44
Cons'ts	1288.51	948.07	804.42	660.77	373.48

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.80

Whirl 7/8 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	21.84	16.07	13.64	11.19	6.33
60	21.47	15.80	13.41	11.02	6.22
61	21.12	15.54	13.18	10.83	6.12
62	20.78	15.29	12.97	10.65	6.02
63	20.45	15.05	12.77	10.48	5.93
64	20.13	14.81	12.56	10.32	5.83
65	19.83	14.58	12.38	10.16	5.74
66	19.52	14.36	12.19	10.01	5.66
67	19.23	14.15	12.01	9.86	5.57
68	18.94	13.94	11.83	9.71	5.49
69	18.67	13.74	11.66	9.57	5.41
70	18.40	13.54	11.49	9.44	5.33
71	18.15	13.35	11.33	9.31	5.26
72	17.89	13.17	11.17	9.17	5.19
73	17.65	12.99	11.02	9.05	5.12
74	17.41	12.81	10.87	8.93	5.04
75	17.18	12.64	10.73	8.81	4.98
76	16.96	12.47	10.58	8.69	4.91
77	16.73	12.31	10.44	8.58	4.85
78	16.52	12.15	10.31	8.47	4.79
79	16.31	12.00	10.18	8.36	4.73
80	16.10	11.85	10.05	8.26	4.66
81	15.91	11.70	9.91	8.15	4.61
82	15.72	11.56	9.82	8.05	4.59
83	15.53	11.44	9.69	7.96	4.49
84	15.34	11.26	9.57	7.86	4.45
85	15.16	11.15	9.46	7.77	4.39
86	14.98	11.02	9.35	7.68	4.34
87	14.81	10.89	9.24	7.59	4.29
88	14.64	10.77	9.14	7.50	4.24
89	14.48	10.65	9.04	7.42	4.19
90	14.31	10.53	8.94	7.34	4.14
91	14.16	10.42	8.84	7.26	4.10
92	14.01	10.30	8.74	7.18	4.06
93	13.85	10.19	8.65	7.11	4.01
94	13.71	10.08	8.56	7.03	3.97
96	13.42	9.87	8.38	6.88	3.89
98	13.14	9.67	8.21	6.74	3.81
100	12.89	9.48	8.04	6.61	3.73
102	12.63	9.29	7.88	6.47	3.66
104	12.39	9.11	7.73	6.35	3.59
106	12.15	8.94	7.54	6.23	3.52
108	11.93	8.78	7.45	6.11	3.45
110	11.71	8.62	7.31	6.01	3.39
Cons'ts	1288.51	948.07	804.42	660.77	373.48

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 8 inches Diameter      Ratio Cylinder to Whirl 1 to 8.30  
 Whirl  $\frac{15}{16}$  inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	79.06	58.17	49.36	40.51	22.91
16	74.12	54.54	46.27	38.01	21.48
17	69.76	51.33	43.55	35.77	20.22
18	65.89	48.48	41.13	33.78	19.09
19	62.42	45.92	38.97	32.01	18.09
20	59.30	43.63	37.02	30.41	17.18
21	56.47	41.55	35.24	28.96	16.37
22	53.90	39.66	33.65	27.64	15.62
23	51.56	37.94	32.19	26.44	14.94
24	49.41	36.36	30.85	25.34	14.32
25	47.44	34.90	29.61	24.32	13.75
26	45.62	33.56	28.47	23.39	13.22
27	43.92	32.32	27.42	22.52	12.73
28	42.35	31.16	26.44	21.72	12.27
29	40.89	30.09	25.53	20.97	11.85
30	39.53	29.08	24.68	20.27	11.45
31	38.25	28.15	23.88	19.29	11.08
32	37.06	27.24	23.13	19.00	10.74
33	35.94	26.44	22.43	18.43	10.41
34	34.88	25.66	21.80	17.88	10.11
35	33.88	24.91	21.15	17.37	9.82
36	32.94	24.24	20.56	16.89	9.54
37	32.05	23.58	20.01	16.43	9.29
38	31.21	22.96	19.43	16.00	9.04
39	30.41	22.37	18.98	15.59	8.81
40	29.65	21.81	18.51	15.20	8.59
41	28.92	21.28	18.07	14.81	8.38
42	28.23	20.77	17.62	14.47	8.18
43	27.58	20.29	17.21	14.14	7.99
44	26.95	19.83	16.82	13.82	7.81
45	26.35	19.39	16.45	13.51	7.63
46	25.78	18.97	16.09	13.22	7.47
47	25.23	18.56	15.75	12.94	7.31
48	24.60	18.18	15.42	12.67	7.16
49	24.20	17.80	15.11	12.41	7.01
50	23.72	17.45	14.80	12.16	6.87
51	23.25	17.11	14.51	11.92	6.73
52	22.80	16.78	14.23	11.68	6.61
53	22.37	16.46	13.97	11.48	6.48
54	21.96	16.16	13.71	11.26	6.36
55	21.56	15.86	13.46	11.05	6.25
56	21.17	15.58	13.22	10.86	6.13
57	20.80	15.31	12.99	10.67	6.03
58	20.45	15.04	12.76	10.49	5.92
Cons'ts	1186.02	872.65	740.43	608.21	343.77

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 8.30

Whirl  $\frac{15}{16}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	20.10	14.80	12.54	10.30	5.82
60	19.76	14.54	12.34	10.13	5.72
61	19.44	14.30	12.13	9.96	5.63
62	19.12	14.07	11.94	9.81	5.54
63	18.81	13.85	11.75	9.65	5.45
64	18.52	13.63	11.56	9.50	5.37
65	18.23	13.42	11.39	9.35	5.28
66	17.97	13.22	11.21	9.21	5.20
67	17.70	13.02	11.05	9.07	5.13
68	17.44	12.83	10.88	8.94	5.05
69	17.19	12.64	10.73	8.81	4.98
70	16.94	12.46	10.57	8.68	4.91
71	16.70	12.29	10.42	8.56	4.84
72	16.47	12.12	10.28	8.44	4.77
73	16.25	11.95	10.14	8.33	4.70
74	16.02	11.79	10.00	8.21	4.64
75	15.81	11.63	9.87	8.10	4.58
76	15.60	11.48	9.74	8.00	4.52
77	15.40	11.33	9.61	7.89	4.46
78	15.20	11.19	9.49	7.78	4.40
79	15.01	11.04	9.37	7.69	4.35
80	14.82	10.90	9.25	7.60	4.29
81	14.64	10.77	9.14	7.50	4.24
82	14.46	10.64	9.02	7.41	4.19
83	14.29	10.51	8.92	7.32	4.14
84	14.12	10.38	8.81	7.24	4.09
85	13.95	10.26	8.71	7.15	4.04
86	13.79	10.14	8.60	7.07	3.99
87	13.63	10.03	8.51	6.99	3.95
88	13.47	9.92	8.41	6.91	3.90
89	13.32	9.80	8.32	6.83	3.83
90	13.18	9.70	8.22	6.75	3.81
91	13.04	9.59	8.13	6.68	3.77
92	12.89	9.48	8.04	6.61	3.73
93	12.75	9.38	7.96	6.54	3.69
94	12.62	9.28	7.87	6.47	3.65
96	12.35	9.09	7.71	6.33	3.58
98	12.10	8.90	7.55	6.20	3.50
100	11.86	8.73	7.40	6.08	3.43
102	11.62	8.56	7.25	5.96	3.37
104	11.40	8.39	7.11	5.84	3.30
106	11.19	8.23	6.98	5.73	3.24
108	10.98	8.08	6.85	5.63	3.18
110	10.78	7.93	6.73	5.52	3.12
Cons'ts	1186.02	872.65	740.43	608.21	343.77

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter      Ratio Cylinder to Whirl 1 to 7.80  
 Whirl 1 inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	75.16	55.30	46.92	38.54	21.78
16	70.46	51.84	43.99	36.14	20.42
17	66.32	48.79	41.40	34.01	19.22
18	62.69	46.08	39.10	32.12	18.15
19	59.34	43.66	37.04	30.43	17.19
20	56.37	41.47	35.19	28.90	16.33
21	53.69	39.50	33.51	27.53	15.55
22	51.24	37.70	31.99	26.29	14.85
23	49.02	36.06	30.60	25.13	14.20
24	46.98	34.56	29.32	24.09	13.61
25	45.09	33.14	28.15	23.12	13.07
26	43.36	31.90	27.07	22.23	12.56
27	41.75	30.72	26.07	21.41	12.10
28	40.30	29.62	25.14	20.65	11.67
29	38.88	28.60	24.27	19.93	11.30
30	37.58	27.65	23.46	19.27	10.84
31	36.37	26.76	22.70	18.63	10.54
32	35.23	25.92	21.99	18.07	10.21
33	34.16	25.19	21.33	17.52	9.90
34	33.16	24.39	20.64	17.00	9.61
35	32.21	23.70	20.11	16.51	9.33
36	31.32	23.04	19.55	16.06	9.07
37	30.47	22.42	19.02	15.62	8.83
38	29.67	21.83	18.52	15.21	8.54
39	28.85	21.27	18.05	14.82	8.38
40	28.18	20.73	17.59	14.45	8.16
41	27.49	20.23	17.16	14.10	7.97
42	26.84	19.75	16.75	13.76	7.77
43	26.26	19.29	16.37	13.44	7.59
44	25.62	18.75	15.99	13.14	7.42
45	25.05	18.43	15.64	12.84	7.26
46	24.51	18.03	15.30	12.56	7.10
47	23.98	17.65	14.97	12.30	6.95
48	23.49	17.28	14.66	12.04	6.80
49	23.01	16.93	14.34	11.79	6.66
50	22.54	16.57	14.07	11.56	6.53
51	22.10	16.26	13.80	11.33	6.40
52	21.68	15.95	13.53	11.11	6.28
53	21.27	15.65	13.28	10.90	6.16
54	20.88	15.36	13.08	10.70	6.05
55	20.49	15.08	12.79	10.51	5.94
56	20.15	14.81	12.57	10.32	5.83
57	19.78	14.55	12.35	10.14	5.73
58	19.38	14.30	12.13	9.96	5.63
Cons'ts	1127.45	829.56	703.87	578.17	326.79



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.80

Whirl 1 inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	19.10	14.06	11.93	9.79	5.54
60	18.79	13.82	11.73	9.63	5.44
61	18.48	13.59	11.57	9.48	5.36
62	18.18	13.38	11.35	9.31	5.27
63	17.89	13.17	11.17	9.18	5.18
64	17.61	12.96	10.99	9.03	5.10
65	17.34	12.76	10.82	8.89	5.02
66	17.08	12.59	10.66	8.76	4.95
67	16.82	12.38	10.50	8.62	4.88
68	16.58	12.18	10.32	8.50	4.80
69	16.32	12.02	10.20	8.38	4.73
70	16.10	11.85	10.05	8.25	4.66
71	15.88	11.68	9.91	8.14	4.60
72	15.66	11.52	9.77	8.04	4.53
73	15.44	11.36	9.64	7.92	4.47
74	15.23	11.21	9.54	7.81	4.41
75	15.01	11.06	9.38	7.70	4.35
76	14.83	10.91	9.26	7.60	4.29
77	14.64	10.77	9.14	7.50	4.24
78	14.42	10.63	9.02	7.41	4.19
79	14.27	10.50	8.91	7.31	4.13
80	14.09	10.36	8.79	7.22	4.08
81	13.91	10.24	8.69	7.14	4.03
82	13.74	10.11	8.58	7.05	3.98
83	13.58	9.94	8.45	6.96	3.92
84	13.42	9.87	8.37	6.88	3.88
85	13.26	9.76	8.28	6.80	3.84
86	13.13	9.64	8.18	6.72	3.79
87	12.96	9.53	8.09	6.64	3.75
88	12.81	9.42	7.99	6.57	3.71
89	12.66	9.32	7.90	6.49	3.67
90	12.52	9.21	7.82	6.42	3.63
91	12.40	9.11	7.73	6.35	3.59
92	12.25	9.01	7.65	6.28	3.55
93	12.12	8.92	7.56	6.22	3.51
94	11.99	8.82	7.48	6.15	3.47
96	11.74	8.64	7.33	6.02	3.40
98	11.50	8.46	7.17	5.90	3.33
100	11.27	8.29	7.03	5.78	3.26
102	11.05	8.13	6.90	5.66	3.20
104	10.84	7.97	6.76	5.55	3.14
106	10.63	7.82	6.64	5.45	3.08
108	10.44	7.68	6.51	5.35	3.02
110	10.24	7.54	6.39	5.25	2.97
Cons'ts	1127.45	829.56	703.87	578.17	326.79

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 8 inches Diameter  
Whirl  $1\frac{1}{16}$  inch Diameter

Ratio Cylinder to Whirl 1 to 7.30  
Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	71.26	52.43	44.49	36.54	20.72
16	66.81	49.15	41.71	34.26	19.43
17	62.88	46.26	39.25	32.24	18.28
18	59.38	43.69	37.07	30.45	17.16
19	56.26	41.39	35.12	28.85	16.36
20	53.44	39.32	33.37	27.41	15.54
21	50.90	37.45	31.78	26.10	14.80
22	48.59	35.75	30.33	24.92	14.13
23	46.47	34.19	29.01	23.83	13.51
24	44.54	32.77	27.80	22.84	12.95
25	42.76	31.46	26.70	21.92	12.43
26	41.11	30.25	25.67	21.08	11.95
27	39.59	29.13	24.71	20.30	11.51
28	38.17	28.09	23.83	19.58	11.10
29	36.86	27.12	23.01	18.90	10.72
30	35.63	26.22	22.25	18.27	10.36
31	34.48	25.37	21.53	17.68	10.03
32	33.41	24.58	20.86	17.13	9.72
33	32.39	23.83	20.22	16.61	9.42
34	31.44	23.13	19.63	16.12	9.14
35	30.54	22.47	19.07	15.66	8.88
36	29.69	21.85	18.54	15.23	8.58
37	28.89	21.25	18.04	14.81	8.40
38	28.13	20.70	17.56	14.43	8.18
39	27.41	20.17	17.11	14.05	7.97
40	26.72	19.66	16.69	13.71	7.77
41	26.07	19.18	16.28	13.37	7.58
42	25.45	18.73	15.89	13.05	7.40
43	24.86	18.29	15.52	12.75	7.20
44	24.30	17.88	15.17	12.46	7.07
45	23.75	17.48	14.83	12.18	6.91
46	23.24	17.10	14.51	11.92	6.76
47	22.74	16.73	14.20	11.66	6.61
48	22.27	16.38	13.90	11.42	6.48
49	21.81	16.05	13.62	11.19	6.34
50	21.38	15.73	13.35	10.96	6.22
51	20.96	15.42	13.08	10.75	6.09
52	20.56	15.13	12.84	10.54	5.98
53	20.17	14.84	12.59	10.34	5.86
54	19.80	14.57	12.36	10.15	5.76
55	19.44	14.30	12.13	9.97	5.65
56	19.09	14.05	11.92	9.79	5.55
57	18.75	13.80	11.71	9.62	5.45
58	18.43	13.56	11.51	9.45	5.36
Cons'ts	1068.88	786.45	667.30	548.14	310.81

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 8 inches Diameter      Ratio Cylinder to Whirl 1 to 7.30

Whirl  $1\frac{1}{8}$  inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	18.12	13.33	11.31	9.29	5.27
60	17.82	13.11	11.13	9.14	5.18
61	17.52	12.89	10.94	8.99	5.10
62	17.24	12.69	10.77	8.84	5.02
63	16.97	12.48	10.59	8.70	4.93
64	16.71	12.29	10.43	8.57	4.86
65	16.44	12.10	10.27	8.43	4.78
66	16.20	11.92	10.11	8.31	4.71
67	15.95	11.74	9.96	8.18	4.64
68	15.72	11.57	9.82	8.06	4.57
69	15.49	11.40	9.67	7.94	4.50
70	15.27	11.24	9.54	7.83	4.44
71	15.05	11.08	9.40	7.72	4.38
72	14.85	10.93	9.27	7.62	4.29
73	14.64	10.77	9.14	7.51	4.26
74	14.45	10.63	9.02	7.41	4.20
75	14.25	10.49	8.90	7.31	4.14
76	14.07	10.35	8.78	7.22	4.09
77	13.89	10.21	8.67	7.12	4.04
78	13.71	10.09	8.56	7.03	3.99
79	13.53	9.96	8.45	6.94	3.93
80	13.36	9.83	8.35	6.85	3.89
81	13.20	9.71	8.24	6.77	3.83
82	13.04	9.59	8.14	6.69	3.79
83	12.88	9.48	8.04	6.60	3.74
84	12.73	9.37	7.95	6.53	3.70
85	12.58	9.25	7.85	6.45	3.66
86	12.43	9.15	7.76	6.38	3.62
87	12.29	9.04	7.67	6.30	3.57
88	12.15	8.94	7.59	6.23	3.54
89	12.01	8.84	7.50	6.16	3.49
90	11.88	8.74	7.42	6.09	3.46
91	11.75	8.64	7.33	6.02	3.42
92	11.62	8.55	7.26	5.96	3.38
93	11.49	8.46	7.18	5.89	3.34
94	11.37	8.37	7.10	5.83	3.31
96	11.14	8.19	6.95	5.71	3.24
98	10.91	8.03	6.81	5.60	3.17
100	10.69	7.87	6.68	5.48	3.11
102	10.48	7.71	6.54	5.38	3.05
104	10.28	7.57	6.42	5.27	2.99
106	10.09	7.42	6.30	5.17	2.93
108	9.90	7.29	6.18	5.08	2.88
110	9.72	7.15	6.07	4.99	2.83
Cons'ts	1068.88	786.45	667.30	548.14	310.81

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

### Front Roll $1\frac{1}{2}$ inch Diameter

Cylinder 8 inches Diameter      Ratio Cylinder to Whirl 1 to 7.00  
 Whirl  $1\frac{1}{8}$  inch Diameter      Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	68.33	50.28	42.65	35.04	19.80
16	64.05	47.13	39.99	32.85	18.56
17	60.29	44.36	37.64	30.92	17.47
18	56.94	41.89	35.54	29.20	16.50
19	53.94	39.69	33.67	27.66	15.63
20	51.24	37.71	31.99	26.28	14.85
21	48.80	35.91	30.47	25.02	14.14
22	46.58	34.27	29.08	23.89	13.50
23	44.56	32.78	27.82	22.85	12.91
24	42.70	31.48	26.66	21.90	12.37
25	40.95	30.16	25.59	21.02	11.88
26	39.42	29.00	24.61	20.21	11.42
27	37.96	27.93	23.69	19.46	11.00
28	36.60	26.93	22.85	18.77	10.61
29	35.34	26.00	22.06	18.12	10.24
30	34.16	25.13	21.32	17.52	9.90
31	33.06	24.32	20.64	16.95	9.58
32	32.03	23.56	19.99	16.42	9.28
33	31.06	22.84	19.38	15.92	9.00
34	30.14	22.18	18.81	15.45	8.73
35	29.28	21.54	18.28	15.01	8.48
36	28.47	20.94	17.77	14.60	8.25
37	27.70	20.38	17.29	14.20	8.03
38	26.97	19.84	16.83	13.83	7.81
39	26.28	19.33	16.40	13.47	7.61
40	25.62	18.85	15.99	13.14	7.42
41	24.99	18.39	15.60	12.82	7.24
42	24.40	17.95	15.23	12.51	7.07
43	23.83	17.53	14.88	12.22	6.90
44	23.29	17.13	14.54	11.94	6.75
45	22.77	16.75	14.21	11.68	6.60
46	22.28	16.39	13.91	11.42	6.45
47	21.80	16.04	13.61	11.18	6.32
48	21.33	15.71	13.33	10.94	6.19
49	20.91	15.39	13.06	10.72	6.06
50	20.49	15.08	12.79	10.51	5.94
51	20.09	14.78	12.54	10.30	5.82
52	19.71	14.50	12.30	10.10	5.71
53	19.33	14.22	12.07	9.91	5.60
54	18.98	13.96	11.84	9.73	5.50
55	18.63	13.71	11.63	9.55	5.40
56	18.30	13.46	11.42	9.38	5.32
57	17.98	13.23	11.22	9.22	5.21
58	17.67	13.00	11.03	9.06	5.12
Cons'ts	1024.95	754.14	639.88	525.61	297.08

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 7.00

Whirl 1⅛ inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	17.37	12.78	10.84	8.90	5.03
60	17.08	12.57	10.66	8.76	4.95
61	16.80	12.36	10.48	8.61	4.87
62	16.53	12.16	10.32	8.47	4.79
63	16.26	11.97	10.15	8.34	4.71
64	16.01	11.78	9.99	8.21	4.64
65	15.76	11.60	9.84	8.09	4.57
66	15.52	11.42	9.69	7.96	4.50
67	15.29	11.25	9.55	7.84	4.43
68	15.02	11.09	9.41	7.72	4.37
69	14.85	10.93	9.27	7.61	4.30
70	14.64	10.77	9.14	7.50	4.24
71	14.43	10.62	9.01	7.40	4.18
72	14.23	10.47	8.88	7.30	4.12
73	14.04	10.33	8.76	7.20	4.06
74	13.85	10.19	8.64	7.10	4.01
75	13.66	10.05	8.53	7.00	3.96
76	13.48	9.92	8.41	6.91	3.90
77	13.31	9.79	8.31	6.82	3.85
78	13.14	9.66	8.20	6.73	3.80
79	12.97	9.54	8.09	6.65	3.77
80	12.81	9.42	7.99	6.57	3.71
81	12.65	9.31	7.89	6.48	3.66
82	12.49	9.19	7.80	6.40	3.62
83	12.34	9.08	7.70	6.33	3.57
84	12.20	8.97	7.61	6.25	3.53
85	12.05	8.87	7.52	6.18	3.49
86	11.91	8.76	7.44	6.11	3.45
87	11.78	8.66	7.35	6.04	3.41
88	11.64	8.56	7.27	5.97	3.37
89	11.51	8.46	7.19	5.90	3.33
90	11.38	8.37	7.10	5.84	3.30
91	11.26	8.28	7.03	5.77	3.26
92	11.14	8.19	6.94	5.71	3.22
93	11.02	8.10	6.88	5.65	3.19
94	10.90	8.02	6.80	5.59	3.16
96	10.67	7.85	6.66	5.47	3.09
98	10.45	7.69	6.52	5.36	3.03
100	10.24	7.54	6.39	5.25	2.97
102	10.04	7.39	6.27	5.15	2.91
104	9.85	7.25	6.15	5.05	2.84
106	9.66	7.11	6.03	4.95	2.80
108	9.49	6.98	5.92	4.86	2.75
110	9.31	6.85	5.81	4.77	2.70
Cons'ts	1024.95	754.14	639.88	525.61	297.08

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 5.90

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	57.59	42.38	35.95	29.53	16.69
16	53.99	39.73	33.71	27.69	15.65
17	50.82	37.39	31.72	26.06	14.73
18	47.99	35.31	29.96	24.61	13.91
19	45.47	33.45	28.39	23.32	13.18
20	43.19	31.78	26.97	22.15	12.52
21	41.14	30.27	25.68	21.10	11.92
22	39.27	28.89	24.51	20.14	11.38
23	37.56	27.64	23.45	19.26	10.89
24	36.00	26.48	22.47	18.46	10.43
25	34.56	25.43	21.57	17.72	10.02
26	33.23	24.45	20.74	17.04	9.63
27	32.00	23.54	19.97	16.41	9.27
28	30.85	22.70	19.26	15.82	8.94
29	29.79	21.92	18.60	15.28	8.63
30	28.79	21.19	17.97	14.76	8.34
31	27.87	20.50	17.40	14.29	8.08
32	26.99	19.86	16.85	13.84	7.82
33	26.18	19.26	16.34	13.42	7.59
34	25.41	18.69	15.86	13.03	7.36
35	24.68	18.16	15.41	12.66	7.15
36	23.99	17.65	14.98	12.30	6.95
37	23.35	17.18	14.58	11.97	6.77
38	22.73	16.72	14.19	11.66	6.59
39	22.15	16.30	13.83	11.36	6.42
40	21.59	15.89	13.48	11.07	6.26
41	21.07	15.50	13.15	10.81	6.11
42	20.57	15.13	12.84	10.55	5.96
43	20.09	14.78	12.54	10.30	5.82
44	19.63	14.44	12.25	10.07	5.69
45	19.20	14.13	11.98	9.84	5.56
46	18.78	13.82	11.72	9.63	5.44
47	18.38	13.52	11.47	9.43	5.33
48	18.00	13.24	11.23	9.23	5.21
49	17.63	12.97	11.01	9.04	5.11
50	17.28	12.71	10.78	8.86	5.01
51	16.94	12.46	10.57	8.69	4.91
52	16.61	12.22	10.37	8.52	4.81
53	16.30	11.99	10.18	8.36	4.72
54	16.00	11.77	9.98	8.20	4.63
55	15.71	11.56	9.81	8.05	4.55
56	15.42	11.35	9.63	7.91	4.47
57	15.16	11.15	9.46	7.77	4.39
58	14.89	10.96	9.30	7.64	4.31
Cons'ts	863.89	635.64	539.33	443.02	250.40

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 5.90

Whirl  $1\frac{5}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	14.64	10.77	9.14	7.51	4.24
60	14.39	10.59	8.98	7.38	4.17
61	14.16	10.42	8.84	7.26	4.10
62	13.93	10.25	8.70	7.14	4.04
63	13.71	10.09	8.56	7.03	3.97
64	13.49	9.93	8.42	6.92	3.91
65	13.29	9.78	8.30	6.82	3.85
66	13.09	9.63	8.17	6.71	3.79
67	12.89	9.49	8.05	6.61	3.74
68	12.70	9.34	7.93	6.51	3.68
69	12.52	9.21	7.82	6.42	3.63
70	12.34	9.08	7.70	6.33	3.57
71	12.17	8.95	7.60	6.24	3.53
72	11.99	8.82	7.49	6.15	3.47
73	11.83	8.71	7.39	6.07	3.43
74	11.67	8.59	7.29	5.98	3.38
75	11.52	8.48	7.19	5.91	3.34
76	11.36	8.36	7.09	5.83	3.29
77	11.22	8.25	7.00	5.75	3.25
78	11.07	8.15	6.91	5.68	3.21
79	10.94	8.05	6.83	5.61	3.17
80	10.79	7.94	6.74	5.53	3.13
81	10.67	7.85	6.66	5.47	3.09
82	10.53	7.75	6.57	5.40	3.05
83	10.41	7.66	6.50	5.34	3.02
84	10.28	7.56	6.42	5.27	2.98
85	10.16	7.48	6.34	5.21	2.95
86	10.04	7.39	6.27	5.15	2.91
87	9.93	7.31	6.20	5.09	2.88
88	9.81	7.22	6.12	5.03	2.84
89	9.71	7.14	6.06	4.98	2.81
90	9.60	7.06	5.99	4.92	2.78
91	9.49	6.98	5.93	4.87	2.75
92	9.39	6.91	5.86	4.81	2.72
93	9.29	6.83	5.80	4.76	2.69
94	9.19	6.76	5.73	4.71	2.66
96	9.00	6.62	5.61	4.61	2.60
98	8.81	6.48	5.50	4.52	2.55
100	8.64	6.35	5.39	4.43	2.50
102	8.47	6.23	5.28	4.34	2.45
104	8.30	6.11	5.18	4.26	2.40
106	8.15	5.99	5.09	4.18	2.36
108	8.00	5.88	4.99	4.10	2.31
110	7.85	5.78	4.90	4.02	2.27
Cons'ts	863.89	635.64	539.33	443.02	250.40



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.84

Whirl  $1\frac{1}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	47.24	34.76	29.49	24.22	13.69
16	44.29	32.59	27.65	22.71	12.83
17	41.68	30.67	26.02	21.37	12.08
18	39.37	28.96	24.58	20.13	11.41
19	37.29	27.44	23.28	19.12	10.81
20	35.43	26.07	22.12	18.17	10.27
21	33.74	24.83	21.06	17.30	9.78
22	32.21	23.70	20.11	16.52	9.33
23	30.81	22.67	19.23	15.80	8.93
24	29.52	21.76	18.43	15.14	8.56
25	28.34	20.85	17.69	14.53	8.21
26	27.25	20.05	17.01	13.97	7.90
27	26.24	19.31	16.38	13.46	7.60
28	25.30	18.62	15.80	12.98	7.33
29	24.43	17.98	15.25	12.53	7.08
30	23.62	17.38	14.74	12.11	6.84
31	22.86	16.82	14.27	11.74	6.62
32	22.14	16.29	13.82	11.35	6.41
33	21.47	15.80	13.40	11.01	6.22
34	20.84	15.33	13.01	10.68	6.04
35	20.24	14.89	12.64	10.38	5.86
36	19.68	14.48	12.29	10.06	5.70
37	19.15	14.09	11.96	9.82	5.55
38	18.64	13.72	11.64	9.56	5.40
39	18.17	13.37	11.34	9.31	5.26
40	17.71	13.03	11.06	9.08	5.13
41	17.28	12.72	10.79	8.86	5.01
42	16.87	12.41	10.53	8.65	4.89
43	16.48	12.12	10.28	8.45	4.77
44	16.10	11.85	10.05	8.26	4.66
45	15.74	11.58	9.83	8.07	4.56
46	15.40	11.33	9.61	7.90	4.46
47	15.07	11.09	9.41	7.73	4.37
48	14.76	10.88	9.21	7.57	4.28
49	14.25	10.64	9.02	7.41	4.19
50	14.17	10.42	8.84	7.26	4.10
51	13.89	10.22	8.67	7.12	4.02
52	13.62	10.02	8.50	6.98	3.95
53	13.37	9.85	8.34	6.85	3.87
54	13.12	9.65	8.19	6.73	3.80
55	12.88	9.48	8.04	6.60	3.73
56	12.65	9.31	7.90	6.49	3.66
57	12.43	9.14	7.76	6.37	3.60
58	12.21	8.64	7.62	6.26	3.54
Cons'ts	708.67	521.44	442.43	363.43	205.42

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.84

Whirl  $1\frac{5}{8}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	12.01	8.83	7.49	6.16	3.48
60	17.81	8.69	7.37	6.05	3.42
61	11.61	8.55	7.25	5.95	3.36
62	11.43	8.41	7.13	5.87	3.31
63	11.24	8.27	7.02	5.76	3.26
64	11.07	8.14	6.91	5.67	3.20
65	10.90	8.02	6.80	5.59	3.16
66	10.73	7.90	6.70	5.50	3.11
67	10.57	7.78	6.60	5.42	3.06
68	10.42	7.66	6.50	5.34	3.02
69	10.27	7.55	6.41	5.26	2.97
70	10.12	7.44	6.32	5.19	2.93
71	9.98	7.34	6.23	5.11	2.89
72	9.84	7.24	6.14	5.03	2.85
73	9.70	7.14	6.06	4.97	2.81
74	9.57	7.04	5.98	4.91	2.77
75	9.44	6.95	5.89	4.84	2.73
76	9.32	6.86	5.82	4.78	2.70
77	9.20	6.77	5.74	4.72	2.66
78	9.08	6.68	5.62	4.65	2.63
79	8.97	6.60	5.60	4.60	2.60
80	8.85	6.51	5.53	4.54	2.56
81	8.74	6.43	5.46	4.48	2.53
82	8.64	6.36	5.39	4.43	2.50
83	8.53	6.28	5.33	4.37	2.47
84	8.43	6.20	5.26	4.32	2.44
85	8.33	6.13	5.20	4.27	2.41
86	8.24	6.06	5.14	4.22	2.38
87	8.14	5.99	5.08	4.17	2.36
88	8.05	5.92	5.02	4.13	2.33
89	7.96	5.85	4.97	4.08	2.30
90	7.87	5.79	4.91	4.03	2.28
91	7.78	5.73	4.86	3.99	2.25
92	7.70	5.66	4.80	3.95	2.23
93	7.62	5.60	4.75	3.90	2.20
94	7.53	5.54	4.70	3.86	2.18
96	7.38	5.43	4.60	3.78	2.14
98	7.22	5.32	4.51	3.70	2.09
100	7.08	5.21	4.42	3.63	2.05
102	6.94	5.11	4.33	3.56	2.01
104	6.81	5.01	4.25	3.49	1.97
106	6.68	4.91	4.17	3.42	1.93
108	6.56	4.82	4.09	3.36	1.90
110	6.44	4.74	4.02	3.30	1.86
Const's	708.67	521.44	442.43	363.43	205.42

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.52

Whirl  $1\frac{3}{4}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	44.12	32.44	27.46	22.63	12.79
16	41.37	30.43	25.82	21.21	11.99
17	38.94	28.64	24.30	19.95	11.28
18	36.77	27.05	22.95	18.81	10.66
19	34.84	25.62	21.80	17.86	10.10
20	33.09	24.34	20.66	16.97	9.59
21	31.52	23.19	19.67	16.16	9.13
22	30.08	22.14	18.78	15.43	8.72
23	28.78	21.17	17.96	14.76	8.34
24	27.58	20.29	17.22	14.14	7.99
25	26.48	19.48	16.53	13.58	7.67
26	25.46	18.73	15.89	13.05	7.38
27	24.52	18.03	15.30	12.57	7.10
28	23.64	17.39	14.76	12.12	6.85
29	22.82	16.79	14.25	11.70	6.61
30	22.06	16.23	13.77	11.31	6.39
31	21.35	15.71	13.33	10.95	6.19
32	20.68	15.21	12.91	10.60	5.99
33	20.06	14.75	12.52	10.28	5.81
34	19.47	14.32	12.15	9.97	5.64
35	18.91	13.91	11.81	9.70	5.48
36	18.39	13.52	11.47	9.40	5.33
37	17.89	13.16	11.17	9.17	5.18
38	17.42	12.81	10.87	8.93	5.05
39	16.97	12.48	10.59	8.70	4.92
40	16.54	12.17	10.33	8.48	4.79
41	16.14	11.88	10.08	8.28	4.68
42	15.76	11.59	9.83	8.08	4.51
43	15.39	11.32	9.61	7.89	4.46
44	15.04	11.07	9.39	7.71	4.36
45	14.71	10.82	9.18	7.54	4.26
46	14.39	10.58	8.98	7.38	4.16
47	14.08	10.36	8.79	7.22	4.08
48	13.74	10.14	8.61	7.07	3.99
49	13.51	9.94	8.43	6.93	3.91
50	13.24	9.74	8.26	6.79	3.83
51	12.98	9.55	8.10	6.65	3.76
52	12.73	9.36	7.99	6.52	3.69
53	12.49	9.19	7.80	6.40	3.62
54	12.26	9.01	7.65	6.28	3.55
55	12.03	8.85	7.51	6.17	3.49
56	11.82	8.69	7.38	6.06	3.47
57	11.61	8.53	7.25	5.95	3.36
58	11.41	8.39	7.12	5.85	3.30
Const's	661.82	486.88	413.18	339.39	191.83

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.52

Whirl  $1\frac{3}{4}$  inch Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	11.22	8.25	7.00	5.75	3.25
60	11.03	8.11	6.86	5.65	3.19
61	10.85	7.98	6.77	5.56	3.14
62	10.67	7.85	6.66	5.47	3.09
63	10.51	7.73	6.54	5.39	3.04
64	10.34	7.60	6.45	5.30	2.99
65	10.18	7.49	6.36	5.23	2.95
66	10.03	7.37	6.26	5.14	2.90
67	9.88	7.27	6.17	5.06	2.86
68	9.73	7.16	6.07	4.98	2.82
69	9.57	7.06	5.99	4.92	2.78
70	9.45	6.95	5.90	4.85	2.74
71	9.32	6.86	5.82	4.78	2.70
72	9.19	6.76	5.73	4.70	2.66
73	9.07	6.70	5.66	4.65	2.63
74	8.94	6.58	5.58	4.58	2.59
75	8.83	6.49	5.51	4.52	2.56
76	8.71	6.40	5.45	4.46	2.52
77	8.60	6.32	5.37	4.41	2.49
78	8.48	6.24	5.29	4.35	2.46
79	8.38	6.16	5.23	4.30	2.43
80	8.27	6.08	5.16	4.24	2.39
81	8.17	6.01	5.10	4.19	2.37
82	8.07	5.94	5.04	4.14	2.34
83	7.97	5.88	4.98	4.09	2.31
84	7.88	5.79	4.91	4.04	2.28
85	7.79	5.73	4.86	3.99	2.26
86	7.69	5.66	4.80	3.94	2.23
87	7.61	5.60	4.75	3.90	2.20
88	7.52	5.53	4.69	3.85	2.18
89	7.44	5.47	4.64	3.81	2.15
90	7.35	5.41	4.59	3.77	2.13
91	7.27	5.35	4.54	3.73	2.11
92	7.19	5.29	4.49	3.69	2.08
93	7.12	5.23	4.44	3.65	2.06
94	7.04	5.18	4.39	3.61	2.04
96	6.87	5.07	4.30	3.53	1.99
98	6.75	4.97	4.21	3.46	1.95
100	6.62	4.87	4.13	3.39	1.91
102	6.49	4.77	4.05	3.32	1.88
104	6.36	4.68	3.99	3.26	1.84
106	6.24	4.59	3.90	3.20	1.81
108	6.13	4.50	3.82	3.14	1.77
110	6.01	4.42	3.75	3.08	1.74
Const's	661.82	486.88	413.18	339.39	191.83

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.

Whirl 2 inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	39.04	28.72	24.37	20.02	11.32
16	36.60	26.93	22.85	18.77	10.61
17	34.45	25.34	21.51	17.66	9.98
18	32.54	23.94	20.31	16.68	9.43
19	30.82	22.68	19.24	15.80	8.93
20	29.28	21.54	18.28	15.01	8.48
21	27.84	20.52	17.41	14.30	8.08
22	26.62	19.58	16.62	13.65	7.71
23	25.46	18.73	15.89	13.06	7.38
24	24.40	17.95	15.23	12.51	7.07
25	23.42	17.23	14.62	12.01	6.79
26	22.52	16.57	14.06	11.55	6.53
27	21.69	15.96	13.54	11.12	6.29
28	20.91	15.39	13.06	10.72	6.06
29	20.19	14.85	12.61	10.35	5.85
30	19.52	14.36	12.18	10.01	5.66
31	18.89	13.90	11.79	9.69	5.47
32	18.30	13.46	11.42	9.39	5.30
33	17.77	13.05	11.08	9.10	5.14
34	17.22	12.67	10.75	8.83	4.99
35	16.73	12.31	10.44	8.58	4.85
36	16.26	11.97	10.16	8.35	4.71
37	15.83	11.64	9.88	8.12	4.58
38	15.41	11.34	9.62	7.90	4.47
39	15.02	11.04	9.37	7.70	4.35
40	14.64	10.77	9.14	7.51	4.24
41	14.28	10.51	8.92	7.32	4.14
42	13.94	10.26	8.70	7.15	4.04
43	13.62	10.02	8.50	6.98	3.95
44	13.31	9.79	8.31	6.82	3.86
45	13.01	9.57	8.12	6.67	3.77
46	12.73	9.36	7.95	6.53	3.69
47	12.46	9.16	7.78	6.39	3.61
48	12.20	8.97	7.62	6.26	3.53
49	11.95	8.79	7.46	6.13	3.46
50	11.71	8.61	7.31	6.01	3.39
51	11.48	8.44	7.17	5.89	3.33
52	11.26	8.28	7.03	5.77	3.26
53	11.05	8.13	6.90	5.66	3.20
54	10.84	7.96	6.77	5.57	3.14
55	10.65	7.83	6.65	5.46	3.08
56	10.45	7.69	6.53	5.36	3.03
57	10.27	7.56	6.41	5.26	2.98
58	10.09	7.46	6.30	5.17	2.92
Const's	585.68	430.93	365.65	300.35	169.76

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 4.00

Whirl 2 inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	9.91	7.30	6.19	5.03	2.88
60	9.76	7.18	6.09	5.00	2.83
61	9.60	7.06	5.99	4.92	2.78
62	9.44	6.95	5.88	4.84	2.74
63	9.28	6.84	5.80	4.77	2.69
64	9.15	6.73	5.71	4.69	2.65
65	9.01	6.62	5.62	4.60	2.61
66	8.87	6.52	5.54	4.55	2.57
67	8.74	6.43	5.45	4.48	2.53
68	8.61	6.33	5.37	4.41	2.49
69	8.48	6.24	5.29	4.35	2.46
70	8.36	6.15	5.22	4.29	2.42
71	8.25	6.06	5.15	4.23	2.39
72	8.13	5.98	5.08	4.17	2.35
73	8.02	5.90	5.01	4.11	2.32
74	7.91	5.82	4.94	4.06	2.30
75	7.81	5.72	4.87	4.00	2.26
76	7.70	5.67	4.81	3.95	2.23
77	7.60	5.59	4.75	3.90	2.20
78	7.51	5.52	4.68	3.85	2.17
79	7.41	5.45	4.62	3.80	2.14
80	7.32	5.38	4.57	3.75	2.12
81	7.23	5.32	4.51	3.70	2.09
82	7.14	5.25	4.46	3.66	2.07
83	7.05	5.19	4.40	3.62	2.04
84	6.96	5.13	4.35	3.57	2.02
85	6.89	5.06	4.30	3.53	1.99
86	6.81	5.01	4.25	3.49	1.97
87	6.73	4.95	4.20	3.45	1.95
88	6.65	4.89	4.15	3.41	1.93
89	6.58	4.84	4.11	3.37	1.90
90	6.50	4.78	4.06	3.33	1.88
91	6.43	4.73	4.02	3.30	1.86
92	6.36	4.69	3.97	3.26	1.84
93	6.29	4.63	3.93	3.22	1.82
94	6.23	4.58	3.89	3.19	1.80
96	6.10	4.48	3.81	3.13	1.76
98	5.97	4.39	3.73	3.06	1.73
100	5.85	4.30	3.65	3.00	1.69
102	5.74	4.22	3.58	2.94	1.66
104	5.63	4.14	3.51	2.89	1.63
106	5.52	4.06	3.45	2.83	1.60
108	5.42	3.99	3.38	2.78	1.57
110	5.32	3.91	3.32	2.73	1.54
Const's	585.68	430.93	365.65	300.35	169.76

# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll 1½ inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 3.20

Whirl 2½ inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
15	31.23	22.98	19.50	16.01	9.05
16	29.28	21.54	18.28	15.01	8.48
17	27.56	20.27	17.20	14.13	7.98
18	26.03	19.15	16.25	13.34	7.54
19	24.65	18.14	15.39	12.64	7.14
20	23.42	17.23	14.62	12.01	6.79
21	22.31	16.41	13.92	11.44	6.46
22	21.29	15.67	13.29	10.92	6.17
23	20.36	14.98	12.71	10.44	5.90
24	19.52	14.36	12.18	10.01	5.65
25	18.74	13.78	11.70	9.61	5.43
26	18.02	13.25	11.25	9.24	5.22
27	17.35	12.76	10.83	8.89	5.03
28	16.73	12.31	10.44	8.58	4.85
29	16.15	11.88	10.08	8.29	4.68
30	15.61	11.49	9.75	8.00	4.52
31	15.11	11.12	9.43	7.78	4.34
32	14.64	10.70	9.14	7.50	4.24
33	14.19	10.44	8.86	7.28	4.11
34	13.78	10.13	8.60	7.06	3.99
35	13.38	9.84	8.35	6.86	3.88
36	13.01	9.57	8.12	6.67	3.77
37	12.66	9.37	7.90	6.49	3.67
38	12.32	9.07	7.69	6.32	3.57
39	12.01	8.83	7.50	6.16	3.48
40	11.71	8.61	7.31	6.00	3.39
41	11.42	8.40	7.13	5.86	3.31
42	11.15	8.20	6.96	5.72	3.23
43	10.89	8.01	6.80	5.58	3.15
44	10.64	7.83	6.64	5.46	3.08
45	10.40	7.66	6.50	5.33	3.01
46	10.18	7.49	6.35	5.22	2.95
47	9.96	7.33	6.20	5.11	2.88
48	9.76	7.18	6.09	5.00	2.82
49	9.56	7.03	5.96	4.90	2.79
50	9.37	6.89	5.85	4.80	2.71
51	9.18	6.75	5.73	4.71	2.66
52	9.01	6.62	5.62	4.62	2.61
53	8.84	6.50	5.51	4.53	2.56
54	8.67	6.38	5.41	4.44	2.51
55	8.51	6.26	5.31	4.36	2.46
56	8.36	6.16	5.22	4.29	2.42
57	8.21	6.04	5.13	4.21	2.38
58	8.07	5.94	5.04	4.11	2.34
Const's	468.55	344.74	292.51	240.28	135.81



# TAPE DRIVE

## TWISTER TWIST GEAR TABLE

Front Roll  $1\frac{1}{2}$  inch Diameter

Cylinder 8 inches Diameter

Ratio Cylinder to Whirl 1 to 3.20

Whirl  $2\frac{1}{2}$  inches Diameter

Front Roll Gear 100 Teeth

Change Gears	Cyl. 20 Stud 138	Cyl. 26 Stud 132	Cyl. 26 Stud 112	Cyl. 26 Stud 92	Cyl. 46 Stud 92
	Twist	Twist	Twist	Twist	Twist
59	7.94	5.84	4.95	4.07	2.30
60	7.80	5.74	4.87	4.00	2.26
61	7.68	5.65	4.79	3.93	2.22
62	7.55	5.56	4.72	3.89	2.17
63	7.43	5.47	4.64	3.81	2.15
64	7.32	5.38	4.57	3.75	2.12
65	7.20	5.30	4.50	3.68	2.08
66	7.09	5.22	4.43	3.64	2.05
67	6.99	5.14	4.37	3.58	2.02
68	6.89	5.06	4.30	3.53	1.99
69	6.78	4.99	4.23	3.48	1.96
70	6.69	4.92	4.17	3.42	1.94
71	6.59	4.85	4.11	3.37	1.91
72	6.50	4.78	4.06	3.33	1.88
73	6.41	4.72	4.00	3.29	1.86
74	6.33	4.65	3.95	3.24	1.83
75	6.24	4.59	3.90	3.20	1.81
76	6.16	4.53	3.84	3.18	1.78
77	6.08	4.47	3.79	3.12	1.76
78	6.00	4.41	3.75	3.08	1.74
79	5.93	4.36	3.70	3.04	1.71
80	5.85	4.30	3.65	3.00	1.69
81	5.78	4.25	3.61	2.96	1.67
82	5.71	4.20	3.56	2.93	1.65
83	5.64	4.15	3.52	2.89	1.63
84	5.57	4.10	3.48	2.86	1.61
85	5.51	4.05	3.44	2.82	1.59
86	5.44	4.00	3.40	2.79	1.57
87	5.38	3.96	3.36	2.74	1.56
88	5.32	3.91	3.32	2.73	1.54
89	5.26	3.86	3.28	2.69	1.51
90	5.20	3.83	3.25	2.66	1.50
91	5.14	3.78	3.21	2.64	1.49
92	5.09	3.74	3.17	2.61	1.47
93	5.03	3.70	3.14	2.59	1.46
94	4.98	3.66	3.10	2.55	1.44
96	4.88	3.59	3.04	2.50	1.41
98	4.78	3.51	2.98	2.45	1.38
100	4.68	3.44	2.92	2.40	1.35
102	4.59	3.37	2.86	2.35	1.33
104	4.50	3.31	2.81	2.31	1.30
106	4.42	3.25	2.75	2.26	1.28
108	4.33	3.19	2.70	2.22	1.25
110	4.25	3.13	2.65	2.18	1.23
Const's	468.55	344.74	292.51	240.28	135.81

Table Showing Number Pounds Twisted Yarn Produced in Ten Hours.—2 Ply.

No of Yarn Spindle to be Twisted.	Rev of Spindle per Minute.	Multiplier 4.			Multiplier 5.			Multiplier 6.			Space of Frame in Inches	Dia. of Ring in Inches
		Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.		
		1 3/8" Roll	1 1/2" Roll		1 3/8" Roll	1 1/2" Roll		1 3/8" Roll	1 1/2" Roll			
6	4500	150.3	137.8	3.97	120.3	110.3	3.18	100.3	91.9	2.65	4	3
7	4750	147.0	134.8	3.33	117.6	107.8	2.67	98.0	89.8	2.22		
8	5000	144.7	132.6	2.87	115.7	106.1	2.29	96.4	88.4	1.91		
9	5200	141.8	130.0	2.50	113.4	104.0	2.01	94.6	86.7	1.67		
10	5300	137.2	125.8	2.18	109.7	100.6	1.75	91.4	83.8	1.46		
11	5500	135.8	124.5	1.96	108.5	99.5	1.57	90.5	83.0	1.30		
12	5500	130.0	119.1	1.71	103.9	95.2	1.38	86.6	79.4	1.15		
13	5650	128.2	117.5	1.57	102.6	94.1	1.25	85.5	78.4	1.05		
14	5750	125.3	115.3	1.43	100.6	92.2	1.14	83.9	76.9	0.96		
15	5900	124.7	114.3	1.31	99.8	91.5	1.06	83.0	76.1	0.88		
16	6000	122.8	112.6	1.22	98.2	90.0	0.98	81.8	75.0	0.81		
17	6000	119.1	109.2	1.12	95.2	87.3	0.89	79.4	72.8	0.74		
18	6050	116.6	106.9	1.03	93.5	85.7	0.82	77.8	71.3	0.69		
19	6100	114.5	105.0	0.96	91.6	84.0	0.77	76.4	70.0	0.64		
20	6150	112.5	103.1	0.91	90.0	82.5	0.73	75.0	68.8	0.60		
22	6300	109.9	100.7	0.80	87.9	80.6	0.64	73.3	67.2	0.54		
24	6500	108.5	99.5	0.73	86.8	79.6	0.58	72.4	66.4	0.49		
26	6550	106.7	97.8	0.66	85.4	78.3	0.53	71.2	65.3	0.44		
28	6800	105.1	96.3	0.60	84.1	77.1	0.48	70.1	64.3	0.40		
30	6900	103.0	94.3	0.55	82.4	75.5	0.44	68.7	63.0	0.37	3	2
32	7000	101.3	92.9	0.51	81.0	74.3	0.41	67.6	62.0	0.34		
34	7000	98.2	90.0	0.46	78.5	72.0	0.37	65.5	60.0	0.31		
36	7000	96.5	87.5	0.42	76.4	70.0	0.34	63.6	58.3	0.29		
38	7000	92.9	85.2	0.39	74.3	68.1	0.32	61.9	56.7	0.26		
40	7000	90.6	83.1	0.37	72.5	66.5	0.30	60.4	55.4	0.24		
50	7500	86.8	79.6	0.28	69.4	63.6	0.22	57.9	53.1	0.19		
60	7500	79.2	72.6	0.22	63.4	58.1	0.17	52.8	48.4	0.15	2 3/4	1 3/4
70	7500	73.4	67.3	0.18	58.7	53.8	0.14	48.9	44.8	0.12		

Allowance has been made for waste, cleaning, oiling and doffing.

Table Showing Number Pounds Twisted Yarn Produced in Ten Hours.—3 Ply.

No of Yarn to be Twisted.	Rev. of Spindle per Minute.	Multiplier 4.				Multiplier 5.				Multiplier 6.				Space of Frame in Inches	Dia. of Ring in Inches
		Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.		
		1½" Roll	1½" Roll		1½" Roll	1½" Roll		1½" Roll	1½" Roll		1½" Roll	1½" Roll			
6	4000	163.6	150.0	6.48	130.9	120.0	5.18	109.1	100.0	4.33	4½	3½			
7	4300	162.9	149.3	5.54	130.3	119.4	4.43	108.6	99.6	3.69					
8	4550	161.2	147.8	4.80	129.1	118.3	3.83	107.5	98.5	3.20					
9	4800	160.4	147.0	4.23	128.3	117.6	3.38	106.9	98.0	2.82					
10	5000	158.6	145.4	3.77	126.7	116.2	3.02	105.7	96.9	2.51	4	3			
11	5200	157.1	144.0	3.39	125.8	115.3	2.71	104.8	96.1	2.26					
12	5350	154.8	141.9	3.07	123.8	113.5	2.46	103.2	94.6	2.05					
13	5500	152.8	140.1	2.80	122.3	112.1	2.24	101.9	93.4	1.87					
14	5600	150.0	137.5	2.54	120.0	110.0	2.03	100.0	91.7	1.69	3½	2½			
15	5750	148.8	136.4	2.36	119.0	109.1	1.89	99.2	90.9	1.57					
16	5850	146.6	134.4	2.18	117.2	107.4	1.74	97.7	89.6	1.45					
17	5850	142.2	130.4	1.99	113.8	104.3	1.59	94.8	86.9	1.33					
18	5950	140.5	128.8	1.86	112.4	103.0	1.49	93.7	85.9	1.24	3¾	2¾			
19	6000	137.9	126.4	1.72	110.4	101.2	1.38	92.0	84.3	1.15					
20	6000	134.5	123.3	1.60	107.6	98.6	1.28	89.7	82.2	1.07					
22	6000	128.2	117.5	1.39	102.5	94.0	1.12	85.5	78.4	0.93					
24	6000	122.8	112.6	1.22	98.2	90.0	0.98	81.9	75.1	0.81	3	2 1¾			
26	6100	120.1	110.1	1.09	95.9	87.9	0.87	80.0	73.3	0.73					
28	6250	118.4	108.5	1.01	94.7	86.8	0.81	78.9	72.3	0.67					
30	6400	117.1	107.3	0.94	93.7	85.9	0.75	78.1	71.6	0.63					
32	6500	115.2	105.6	0.86	92.1	84.4	0.69	76.8	70.4	0.57	3	2¾			
34	6500	111.8	102.5	0.79	89.4	82.0	0.63	74.5	68.3	0.53					
36	6500	108.5	99.5	0.73	86.9	79.7	0.58	72.4	66.4	0.49					
38	6500	105.6	96.8	0.67	84.5	77.5	0.54	70.5	64.6	0.45					
40	6500	102.9	94.3	0.62	82.4	75.5	0.50	68.7	63.0	0.41	2¾	2 1¾			
50	7000	99.2	90.9	0.47	79.3	72.8	0.38	66.2	60.7	0.31					
60	7000	90.5	83.0	0.37	72.5	66.5	0.30	60.4	55.4	0.25					
70	7000	83.8	76.8	0.30	67.1	61.5	0.24	55.9	51.2	0.20					

Allowance has been made for waste, cleaning, oiling and doffing.

Table Showing Number Pounds Twisted Yarn Produced in Ten Hours.—4 Ply.

No. of Yarn to be Twisted.	Rev. of Spindle per Minute.	Multiplier 4.				Multiplier 5.				Multiplier 6.				Space of Frame in Inches	Dia. of King in Inches
		Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.		
		1½"Roll	1½"Roll		1½"Roll	1½"Roll		1½"Roll	1½"Roll		1½"Roll	1½"Roll			
6	3500	165.3	151.5	8.73	132.3	121.3	6.98	110.2	101.0	5.82	5	4			
7	3750	163.2	149.0	7.39	131.3	120.4	5.95	109.3	100.2	4.95					
8	3950	161.5	148.0	6.40	129.3	118.5	5.13	107.7	98.7	4.27					
9	4100	158.2	145.0	5.57	126.5	116.0	4.46	105.5	96.7	3.72					
10	4300	157.5	144.4	4.99	125.8	115.3	3.99	104.9	96.2	3.33					
11	4450	155.4	142.5	4.48	124.3	113.9	3.58	103.5	94.9	2.98					
12	4600	153.7	140.9	4.07	123.0	112.8	3.25	102.5	94.0	2.71					
13	4700	151.0	138.4	3.69	120.8	110.7	2.94	100.6	92.2	2.46					
14	4800	148.5	136.1	3.36	118.8	108.9	2.69	99.0	90.8	2.24					
15	4900	146.3	134.1	3.09	117.2	107.4	2.48	97.6	89.5	2.06					
16	5000	144.7	132.6	2.87	115.7	106.1	2.29	96.4	88.4	1.91					
17	5100	143.1	131.2	2.67	114.5	105.0	2.13	95.4	87.5	1.78					
18	5200	141.7	129.9	2.50	113.4	104.0	2.00	94.5	86.6	1.67	4	3			
19	5250	139.3	127.5	2.32	111.5	102.2	1.86	92.9	85.2	1.55					
20	5300	137.2	125.8	2.18	109.7	100.6	1.75	91.4	83.8	1.45					
22	5450	134.5	123.3	1.94	107.6	98.6	1.55	89.7	82.2	1.29					
24	5600	132.2	121.2	1.75	105.8	97.0	1.40	88.2	80.9	1.17					
26	5700	129.4	118.6	1.58	103.5	94.9	1.26	86.2	79.0	1.05	3½	2½			
28	5800	127.0	116.4	1.44	101.5	93.0	1.15	84.6	77.6	0.96					
30	5900	124.7	114.3	1.31	99.8	91.5	1.05	83.1	76.2	0.87					
32	5950	121.8	111.7	1.21	97.4	89.3	0.97	81.2	74.4	0.81					
34	6000	119.1	109.2	1.12	95.2	87.3	0.90	79.4	72.8	0.75					
36	6050	116.7	107.0	1.03	93.4	85.6	0.82	77.8	71.3	0.69	3	2			
38	6100	114.5	105.0	0.96	91.6	84.0	0.77	76.4	70.0	0.64					
40	6100	111.6	102.3	0.89	89.3	81.9	0.71	74.4	68.2	0.60					
50	6450	105.6	96.8	0.67	84.5	77.5	0.54	70.4	64.5	0.45					
60	6750	100.9	92.5	0.54	80.7	74.0	0.43	67.2	61.6	0.36					
70	6900	95.4	87.5	0.44	76.4	70.0	0.35	63.6	58.3	0.29					

Allowance has been made for waste, cleaning, oiling and doffing.

Table Showing Number Pounds Twisted Yarn Produced in Ten Hours.—5 Ply.

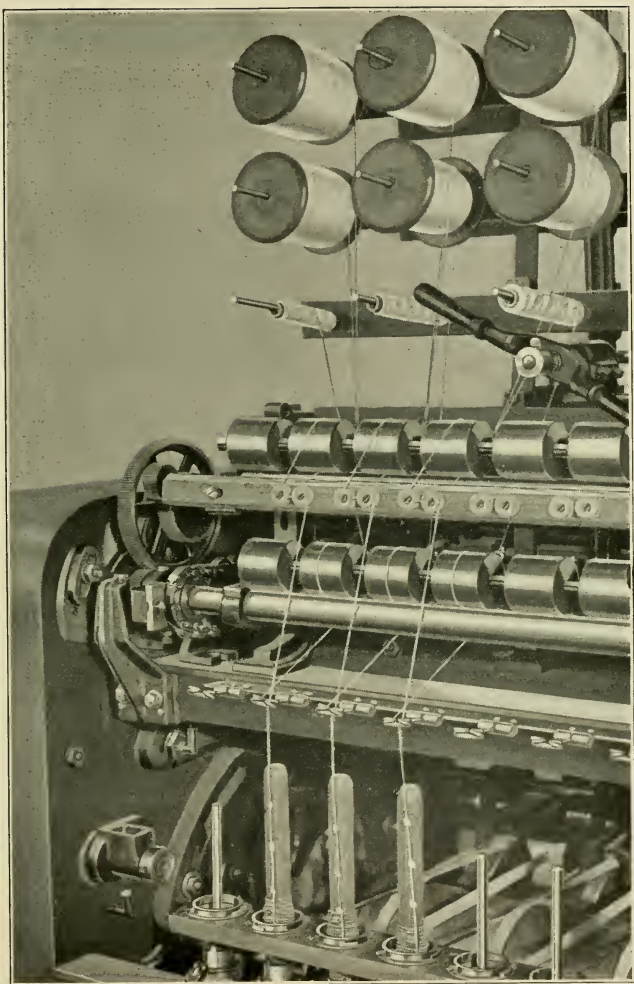
No. of Yarn to be Twisted	Rev. of Spindle per Minute.	Multiplier 4.			Multiplier 5.			Multiplier 6.			Space of Frame in Inches	Dia. of Ring in Inches
		Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle		
		1 3/4" Roll	1 1/2" Roll		1 3/4" Roll	1 1/2" Roll		1 3/4" Roll	1 1/2" Roll			
6	2800	148.0	135.7	9.77	118.3	108.4	7.81	98.7	90.5	6.52	5 1/2	4 1/2
7	3000	146.8	134.6	8.31	117.3	107.5	6.64	97.8	89.7	5.94		
8	3150	144.1	132.1	7.13	115.4	105.8	5.71	96.1	88.1	4.75		
9	3300	142.2	130.4	6.26	113.8	104.3	5.01	94.9	87.0	4.17		
10	3400	139.1	127.5	5.51	111.3	102.0	4.41	92.7	85.0	3.67	5	4
11	3550	138.6	127.1	4.99	110.8	101.6	3.99	92.4	84.7	3.33		
12	3650	136.3	124.9	4.50	109.0	99.9	3.60	90.8	83.2	3.00		
13	3750	134.6	123.4	4.10	107.7	98.7	3.29	89.8	82.3	2.73		
14	3800	131.5	120.5	3.72	105.1	96.3	2.98	87.6	80.3	2.48		
15	3900	130.3	119.4	3.44	104.3	95.6	2.75	86.8	79.6	2.29		
16	3950	127.7	117.1	3.16	102.2	93.7	2.53	85.2	78.1	2.11		
17	4000	125.5	115.0	2.93	100.4	92.0	2.34	83.7	76.7	1.95		
18	4050	123.5	113.2	2.72	98.8	90.6	2.18	82.4	75.5	1.81		
19	4100	121.7	111.6	2.54	97.3	89.2	2.03	81.1	74.3	1.70	4 1/2	3 1/2
20	4150	120.1	110.1	2.38	96.1	88.1	1.90	80.1	73.4	1.59		
22	4200	116.2	106.5	2.09	92.7	85.0	1.67	77.2	70.8	1.39		
24	4300	113.6	104.1	1.88	90.9	83.3	1.50	75.7	69.4	1.25		
26	4350	110.4	101.2	1.68	88.3	80.9	1.34	73.6	67.5	1.12		
28	4400	107.6	98.6	1.52	86.1	78.9	1.22	71.7	65.6	1.01		
30	4500	106.3	97.4	1.41	85.1	78.0	1.13	70.9	65.0	0.94		
32	4550	104.1	95.4	1.29	83.3	76.4	1.03	69.4	63.6	0.86		
34	4600	102.1	93.6	1.19	81.7	74.9	0.95	68.0	62.3	0.79	4	3
36	4600	99.2	90.9	1.09	79.4	72.8	0.87	66.1	60.6	0.73		
38	4600	96.6	88.7	1.01	77.3	70.9	0.81	64.4	59.0	0.67		
40	4600	94.1	86.3	0.93	75.3	69.0	0.74	62.7	57.5	0.62		
50	4900	89.7	82.2	0.72	71.7	65.7	0.58	59.8	54.8	0.48		
60	5200	86.8	79.6	0.58	69.5	63.7	0.46	57.9	53.1	0.39	3 1/2	2 1/2
70	5450	84.3	77.3	0.48	67.4	61.8	0.38	56.2	51.5	0.32		

Allowance has been made for waste, cleaning, oiling and doffing.

Table Showing Number Pounds Twisted Yarn Produced in Ten Hours.—6 Ply.

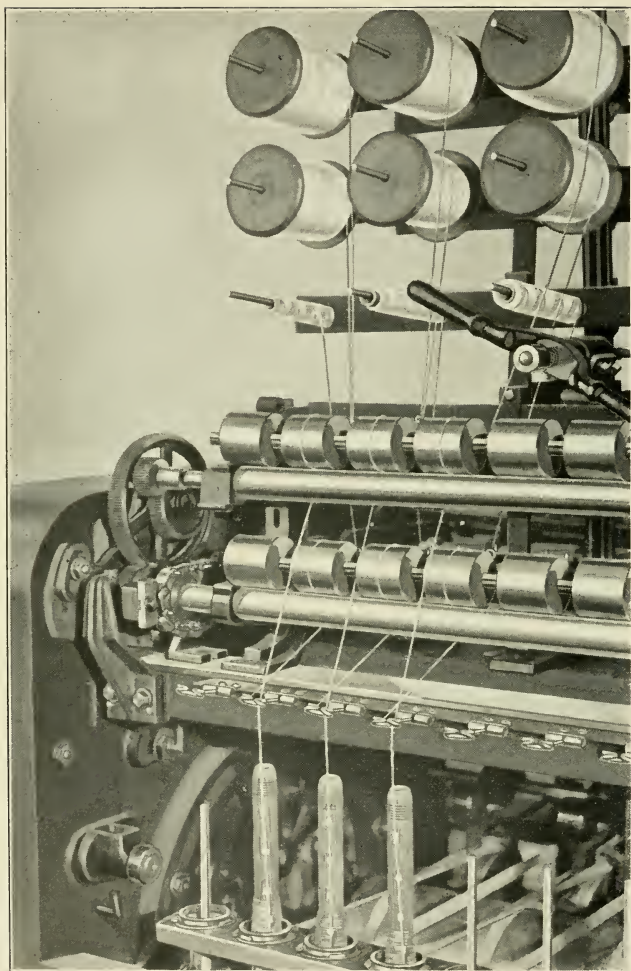
No of Yarn Spindle to be Twisted.	Rev. of Spindle per Minute.	Multiplier 4.			Multiplier 5.			Multiplier 6.			Space of Frame in Inches	Dia. of Ring in Inches
		Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.	Rev. per Min.		Pounds per Spindle.		
		1 $\frac{1}{2}$ " Roll	1 $\frac{3}{4}$ " Roll		1 $\frac{1}{2}$ " Roll	1 $\frac{3}{4}$ " Roll		1 $\frac{1}{2}$ " Roll	1 $\frac{3}{4}$ " Roll			
6	2400	138.9	127.3	11.00	111.1	101.8	8.80	92.6	84.9	5 $\frac{1}{2}$	4 $\frac{1}{2}$	
7	2550	136.7	125.3	9.28	109.3	100.2	7.42	91.1	83.5			
8	2700	135.3	124.0	8.04	108.4	99.4	6.44	90.2	82.7			
9	2850	134.6	123.4	7.13	107.8	98.8	5.70	89.8	82.3	5	4	
10	2950	132.3	121.3	6.29	105.9	97.1	5.03	88.1	80.8			
11	3050	130.3	119.4	5.64	104.3	95.6	4.51	86.9	79.7			
12	3150	128.8	118.1	5.10	103.1	94.5	4.08	85.9	78.7			
13	3250	127.7	117.6	4.68	102.2	93.7	3.74	85.2	78.1			
14	3350	126.9	116.3	4.31	101.5	93.0	3.45	84.6	77.6			
15	3450	126.4	115.9	4.00	101.0	92.6	3.20	84.2	77.2			
16	3550	125.8	115.3	3.74	100.7	92.3	2.99	83.9	76.9			
17	3600	125.8	115.3	3.46	99.0	90.8	2.77	82.5	75.6			
18	3650	124.9	114.7	3.23	97.6	89.5	2.58	81.3	74.5			
19	3700	120.3	110.3	3.01	96.2	88.2	2.41	80.2	73.5	4 $\frac{1}{2}$	3 $\frac{1}{2}$	
20	3750	118.9	109.0	2.83	95.1	87.2	2.26	79.3	72.7			
22	3850	116.3	106.6	2.51	93.1	85.3	2.01	77.6	71.1			
24	4000	115.7	106.1	2.30	92.6	84.9	1.84	77.2	70.8			
26	4050	112.5	103.1	2.06	90.1	82.6	1.65	75.1	68.8			
28	4100	109.8	100.6	1.86	87.9	80.6	1.49	73.2	67.1	4	3	
30	4150	107.4	98.5	1.70	85.9	78.7	1.36	71.6	65.6			
32	4200	105.2	96.4	1.56	84.2	77.2	1.25	70.1	64.3			
34	4200	102.1	93.6	1.43	81.7	74.9	1.14	68.1	62.4			
36	4250	100.4	92.0	1.32	80.3	73.6	1.06	66.9	61.3			
38	4250	97.7	89.6	1.23	78.2	71.7	0.98	65.2	59.8	3 $\frac{1}{2}$	2 $\frac{1}{2}$	
40	4250	93.4	85.6	1.14	76.2	69.9	0.91	63.5	58.2			
50	4550	91.2	83.6	0.87	73.0	66.9	0.70	60.8	55.7			
60	4750	86.9	79.7	0.70	69.5	63.7	0.56	58.0	53.2			
70	4950	83.9	76.9	0.58	67.1	61.5	0.46	55.9	51.2	3	2	

Allowance has been made for waste, cleaning, oiling and doffing.



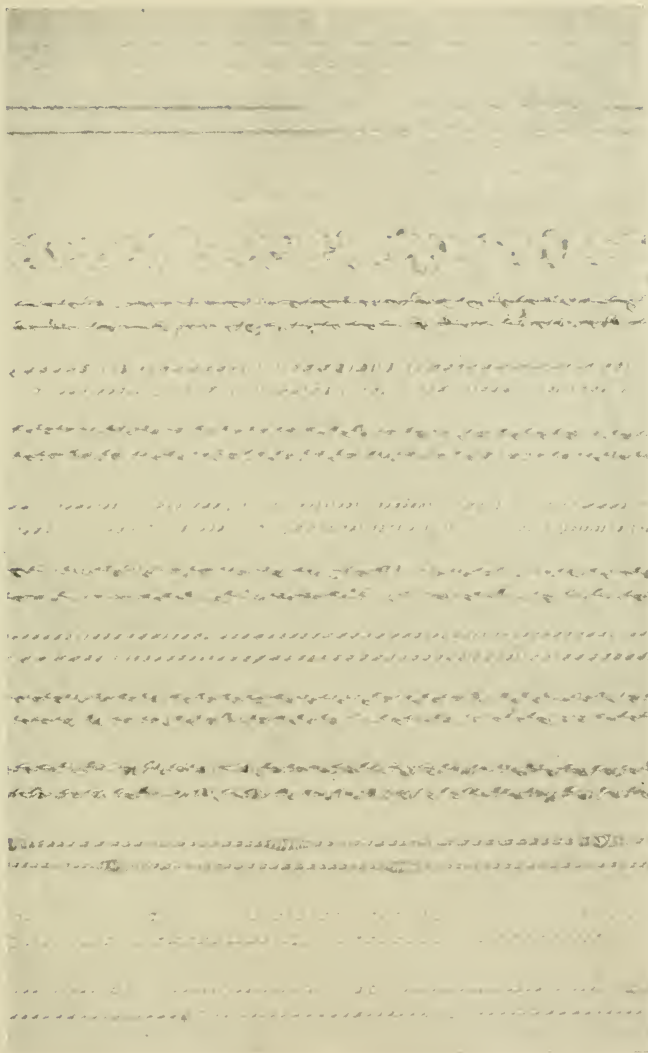
**Fancy Yarn Machine  
with Tension Bar**





**Fancy Yarn Machine  
without Tension Bar**

# Fancy Yarns



15  
14  
13  
12  
11  
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1

## FANCY YARNS

In the manufacture of some varieties of dress goods **fancy yarns** are sometimes required. These yarns are composed usually of two or more threads twisted together in a predetermined manner to give the desired effect in the cloth being woven.

The component parts of a fancy yarn may differ in a number of features, viz.: counts, quality of material, twist per inch, direction of twist, and delivery ratio of the different components. A good knowledge of yarns and the influence of twist on yarns compounded together is necessary to obtain satisfactory results.

There is a large variety of fancy yarns in demand by manufacturers, some of which we illustrate on preceding page, wherein Nos. 1, 2 and 3 show nub yarns; Nos. 4, 5, 6, 7, 8, 9, 10, 11, and 12 show various forms of ratine or loop yarns; and 13, 14 and 15 are flake yarns.

Where a small quantity of yarn is required these yarns may be made, in an economical manner, on the ordinary spinning and twisting frames, by proper manipulation of the gearing, rolls and guides; but where a larger quantity is required, it is advisable to employ a machine specially fitted for the purpose. With this object in view, we have designed and placed on the market our Fancy Yarn Machine which has proven, by repeated installation, to be particularly adapted for the manufacture of many styles of fancy yarns.

As will be seen by reference to the illustrations on pages 257 and 258 the machine comprises two sets of rolls one above the other held in bearings fastened to rigid uprights bolted to the roll beam of the ordinarily constructed twisting frame. The upper set of rolls delivers the main thread to a guide and thence through traveler and ring to the twisting spindle, while the lower set of rolls delivers the auxiliary thread, which forms the nubs

or bunches on the main thread, by winding thereon at predetermined intervals. The upper rolls have an intermittent rotary motion, thus varying the delivery of the main thread, whilst the lower rolls have a continuous rotary motion delivering the auxiliary thread through a guide and thence being wound onto the main thread forming a bunch at each stoppage of the upper rolls and then being twisted into the main thread in the spaces between the bunches.

The relative movements of the two sets of rolls are controlled by means of a travelling pattern chain made up of a number of low links with one or more riser links. The riser links acting in conjunction with a shifting lever disengages the clutch which transmits motion from the lower rolls to the upper rolls, thus stopping the delivery of the main thread; consequently, the auxiliary thread, whose delivery is continuous, is twisted into a bunch on the main thread, the size of the bunch depending on the duration of the disengagement of the clutch.

By varying the length of the chain and the number and positions of the riser links, a large variety of combinations may be had.

In some types of fancy yarn it is of the greatest importance that the main thread be delivered under a proper tension in order to derive desired results. Where this is desired, the machine may be provided with porcelain knobs fastened to a wooden bar located in front of the upper set of rolls (see page 257.) The requisite tension is imparted to the thread by one or more turns about the knobs.

The machine as above described is only adapted for making nub and flake yarns, but by disconnecting the chain, thus continuously running both set of rolls at requisite delivery ratios and using proper arrangements of thread guides with particular attention given to the tension and twist, other styles of fancy yarns may be readily made.

For the information of those having to do with the operation of our Fancy Yarn Machine we present in the following pages, data on yarns used

and gears required in producing some of the fancy yarns shown on page 259. We hope this will afford sufficient information to enable anyone to approximately calculate the necessary yarn components and gearing required for producing their particular yarn requirements.

### No. 1 Nub Yarn

Components  $\left\{ \begin{array}{l} 2 \text{ ends } 15\text{'s main yarn} \\ 1 \text{ end } 15\text{'s auxiliary yarn} \end{array} \right.$

Gearing:

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear, 84 teeth . . . . . Top Roll Gear, 42 teeth.

Twist: 26 turns per inch.

Pattern Chain: 5 low links, 1 riser and repeat.

### No. 3 Nub Yarn

Components  $\left\{ \begin{array}{l} 2 \text{ ends } 15\text{'s main yarn} \\ 1 \text{ end } 15\text{'s auxiliary yarn} \end{array} \right.$

Gearing:

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear 84 teeth . . . . . Top Roll Gear, 42 teeth.

Twist: 23 turns per inch

Pattern Chain: 5 low links, 3 risers and repeat.

### No. 4 Ratine Yarn

First Operation:

Components  $\left\{ \begin{array}{l} 2 \text{ ends } 16\text{'s main yarn} \\ 1 \text{ end } 16\text{'s auxiliary yarn} \end{array} \right.$

### Gearing:

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear, 52 teeth . . . . . Top Roll Gear, 42 teeth.

Pattern Chain not required

Right Hand Twist: 20 turns per inch

### Second Operation

One end of the first operation twisted 7 turns to the inch left hand with one end 16's as a binder. This may be done by running the work through the lower set of rolls.

## No. 11 Ratine Yarn

### First Operation:

Components  $\left\{ \begin{array}{l} 2 \text{ ends } 30\text{'s } 2\text{-ply, main yarn.} \\ 2 \text{ ends } 30\text{'s } 2\text{-ply, auxiliary yarn.} \end{array} \right.$

### Gearing

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear, 52 teeth . . . . . Top Roll Gear, 42 teeth.

Pattern Chain not required.

Right Hand Twist: 18 turns per inch.

### Second Operation:

One end of the first operation twisted 7 turns per inch left hand with one end 30's as a binder.

## No. 15 Flake Yarn

Components  $\left\{ \begin{array}{l} 2 \text{ ends } 30\text{'s drawn through bottom rolls.} \\ 1 \text{ end } 2 \text{ hank roving drawn through top rolls.} \end{array} \right.$

Gearing:

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear, 40 teeth . . . . . Top Roll Gear, 42 teeth.

Pattern Chain: 5 low links, 3 risers and repeat.

Left hand Twist: 9 turns per inch.

**No. 14 Flake Yarn**

Components { 2 ends 16's drawn through bottom rolls.  
                  { 2 ends 4 hank roving drawn through top rolls.

Gearing:

Crown Gear, 168 teeth . . . . . Bottom Roll Gear, 60 teeth.  
Change Gear, 40 teeth . . . . . Top Roll Gear, 42 teeth.

Pattern Chain: 5 low links, 4 risers and repeat

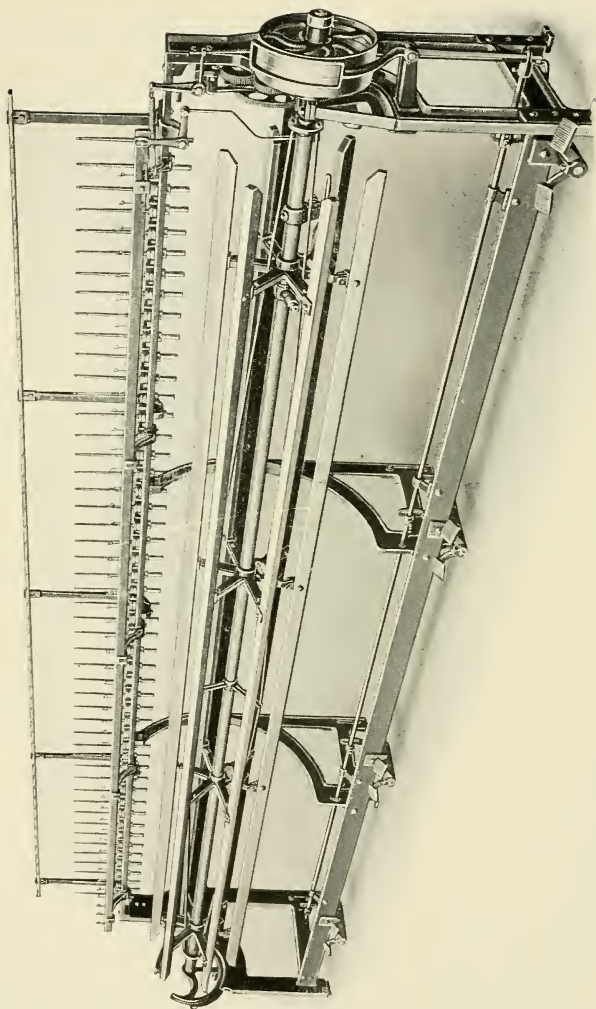
Left Hand Twist: 7 turns per inch.

NOTE:—In making flake yarn it is necessary to use a small pressure roll on the top-roll of the lower set of rolls.

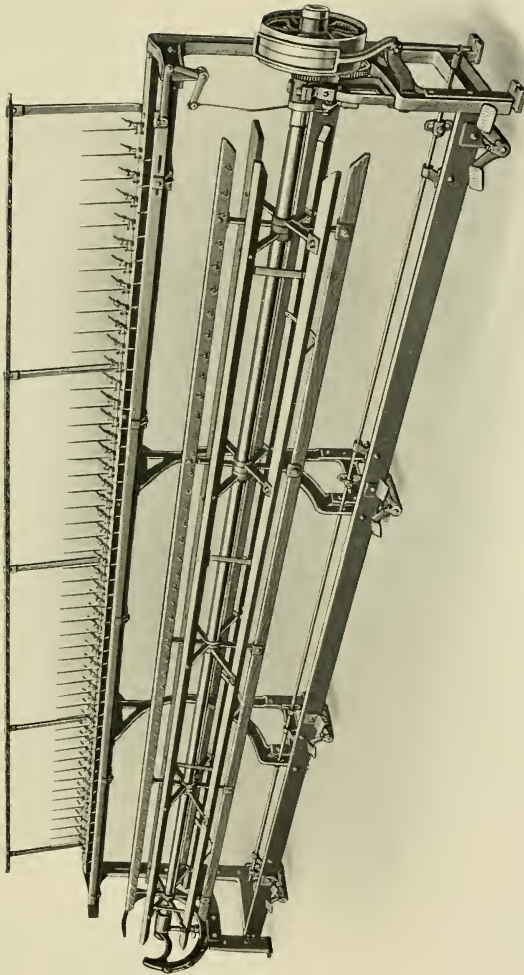
Our fancy yarn mechanism may be readily applied to old twistors of our make.



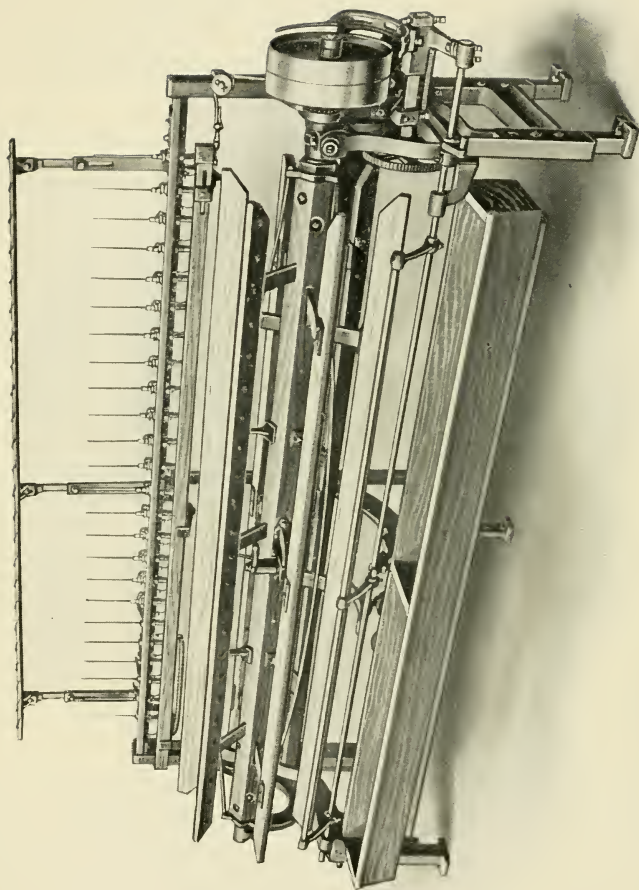
# REELING



Model D Reel



Model E Reel



Model F Reel

## WHITIN REELS

To satisfy the demands of Textile manufacturers who desire to wind their yarns into hanks or skeins for the requirements of bleaching, dyeing, mercerizing or re-winding processes, we build three types of Reels, viz:

Model D, Model E and Model F, differing from one another in designs of frames and construction of swifts.

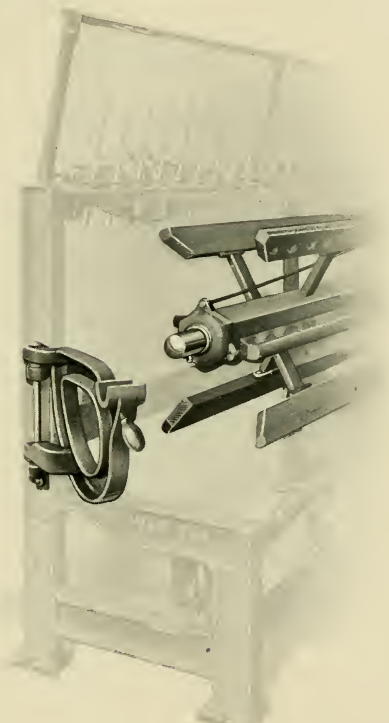
### MODEL D

**This machine** is equipped with a swift comprising six slats held by adjustable arms mounted on an iron shaft revoluble in bearings at the ends of the machine. Skeins of 54 inches, 60 inches, 72 inches and 90 inches in circumference may be had as desired. The skeins are loosened from the swift by depressing two adjacent slats after which the yarn may be removed from the machine by means of the well known "wheel" method of doffing.

### MODEL E

**The swift** of this machine is adjustable for 54 inch, 60 inch or 72 inch skeins.

The adjustable arms are held on an iron shaft, two of the arms being in a swinging relation with the shaft whereby the skeins may be loosened for doffing by the "wheel" method.



**Model F Doffing Gate**

## MODEL F

**This machine** differs from the others in that the swift is made of six slats held by wooden arms connected to a wooden shaft. The arms of two of the slats are pivoted to the shaft so that these slats may be depressed thus furnishing means for loosening the skeins which may then be removed by the "gate" method of doffing. The swift is non-adjustable but is made in two sizes, viz: 54 inches and 60 inches.

The following features are common to all three types of machines:

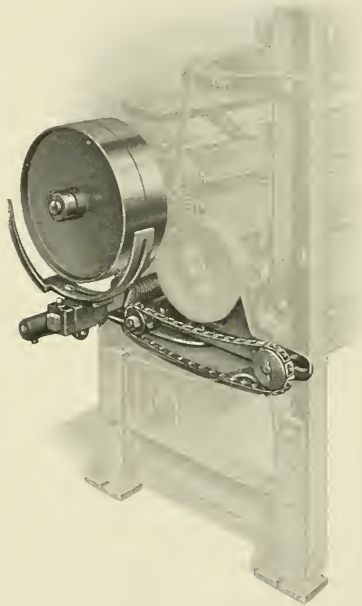
**The frames** of the machines are of rigid construction, the ends and sampsons of which being tied together by substantial girts of iron so that the heaviest yarns may be reeled at the highest practical speeds with a minimum of vibration in the frame of the machine.

**The spindles** for the usual equipment of the machines are provided with a uniform friction arrangement which imparts an even drag or tension to the yarn, but if so ordered an adjustable tensioning means will be furnished.

The yarn **traverse motion** may be either the plain or cross type. In cross reeling the yarn is wound on the swift in a diamond form, each layer being laid uniformly on top of the preceding layer, thus preventing entanglement during subsequent processes.

**A measuring attachment** may be had whereby the machine automatically stops when any predetermined number of yards have been reeled.

**Bobbins** are furnished when ordered.



Model F Measuring Attachment.

The driving pulleys are 12 inches in diameter by 2 inches face and run from 100 to 175 revolutions per minute according to the size of skein and number of yarn. The machine may be arranged to be driven by an electric motor.

**Horse Power:** Approximately 300 spindles per horse power.

**Floor Space:** Width overall 26 inches, length according to number spindles and space, see table below.

### Weights per foot in length:

Domestic:

Net, 59 pounds.

Gross, 78 pounds.

Export:

Gross, 89 pounds.

Cubic feet, 3.6.

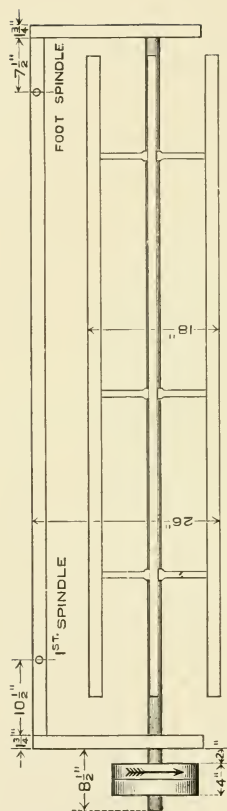
## FLOOR SPACE OF MODEL E REELS

No. of Spindles	2½ in. Space.		3 in. Space.		3½ in. Space.		4 in. Space.		4 in. Space.		No. of Spindles
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	
30											30
32											32
34					11	5¼			11	6¾	34
36			11	3	11	11¾			12	2¼	36
38			11	9	12	6¾			12	9¾	38
40	11	5¼	12	3	13	0¾			13	5¼	40
42	11	10¾	12	9	13	7¼			14	8¼	42
44	12	4¼	13	3	14	1¾			15	3¾	44
46	12	9¾	13	9	14	8¼			15	11¼	46
48	13	3¾	14	3	15	2¾					48
50	13	8¾	14	9	15	9¼					50
52	14	2¼	15	3	16	3¾					52
54	14	7¾	15	9							54
56	15	1¼	16	3							56
58	15	6¾									58
60	16	0¼									60

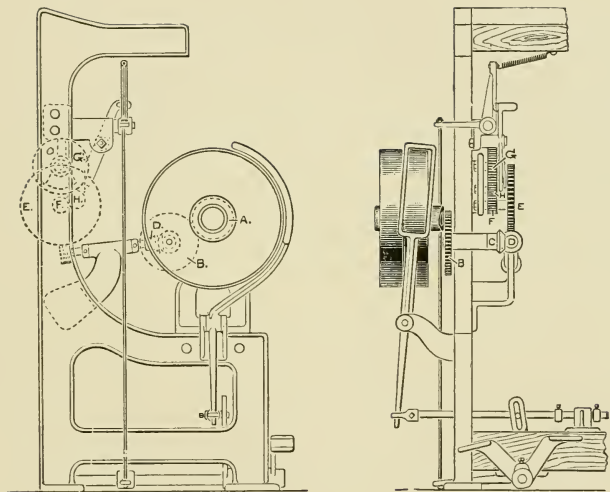
Model D Reel 2¼ inches longer.

“ F “ ¾ “ “





FLOOR PLAN OF REEL



STOP-MOTION DIAGRAM  
OF  
MODELS D AND E REELS

# Change Gear Tables

For Models D and E

## Stop Motions

Plain Traverse.

Yds.	A	B	D	F	G	H	54" Reel.		60" Reel.		72" Reel.		90" Reel.	
							C	E	C	E	C	E	C	E
120	38	63	20	42	16	21	21	133	20	114	20	95	20	76
240	38	63	20	21	16	42	21	133	20	114	20	95	20	76
360	38	63	20	21	24	42	21	133	20	114	20	95	20	76
480	38	63	20	21	32	42	21	133	20	114	20	95	20	76
600	38	63	20	21	40	42	21	133	20	114	20	95	20	76
720	38	63	20	21	48	42	21	133	20	114	20	95	20	76
840	38	63	20	21	56	42	21	133	20	114	20	95	20	76

Gears F and H are interchangeable.

This Motion cannot be used on Cross Traverse.

Cross Traverse.

Yds	A	B	F	G	H	54" Reel.			60" Reel.			72" Reel.			90" Reel.		
						C	D	E	C	D	E	C	D	E	C	D	E
120	42	91	42	16	21	26	20	126	26	21	108	39	21	135	39	21	108
240	42	91	21	16	42	26	20	126	26	21	108	39	21	135	39	21	108
360	42	91	21	24	42	26	20	126	26	21	108	39	21	135	39	21	108
480	42	91	21	32	42	26	20	126	26	21	108	39	21	135	39	21	108
600	42	91	21	40	42	26	20	126	26	21	108	39	21	135	39	21	108
720	42	91	21	48	42	26	20	126	26	21	108	39	21	135	39	21	108
840	42	91	21	56	42	26	20	126	26	21	108	39	21	135	39	21	108

Gears F and H are interchangeable.

This Motion cannot be used on Plain Traverse.

## Reel Production Tables.

54 IN. REEL. Revolutions per Minute.							60 IN. REEL. Revolutions per Minute.						
No. Yarn.	125	130	135	140	145	150	No. Yarn.	125	130	135	140	145	
1	50.22	52.24	54.24	56.25	58.26	60.27	1	53.57	58.04	60.27	62.50	64.74	
2	25.11	26.12	27.12	28.12	29.13	30.14	2	26.79	29.02	30.14	31.25	32.37	
3	16.74	17.41	18.08	18.75	19.42	20.09	3	17.86	19.35	20.09	20.84	21.58	
4	12.65	13.06	13.56	14.07	14.57	15.07	4	13.40	14.51	15.07	15.62	16.18	
5	10.04	10.45	10.85	11.25	11.65	12.06	5	10.72	11.61	12.06	12.50	12.95	
6	8.37	8.71	9.03	9.38	9.71	10.05	6	8.93	9.30	9.67	10.42	10.79	
7	7.17	7.46	7.75	8.04	8.33	8.61	7	7.66	7.97	8.61	8.93	9.25	
8	6.28	6.53	6.78	7.04	7.28	7.54	8	6.70	6.98	7.26	7.82	8.09	
9	5.58	5.81	6.03	6.25	6.48	6.70	9	5.95	6.20	6.45	6.95	7.20	
10	5.02	5.23	5.43	5.63	5.83	6.03	10	5.36	5.58	5.81	6.25	6.48	
11	4.56	4.75	4.93	5.12	5.30	5.48	11	4.87	5.08	5.28	5.64	5.89	
12	4.18	4.36	4.52	4.69	4.86	5.02	12	4.46	4.65	4.84	5.21	5.40	
13	3.86	4.02	4.17	4.33	4.48	4.64	13	4.12	4.29	4.47	4.81	5.00	
14	3.58	3.73	3.88	4.02	4.16	4.30	14	3.83	3.99	4.15	4.47	4.63	
15	3.34	3.48	3.62	3.75	3.89	4.02	15	3.57	3.72	3.87	4.17	4.32	
16	3.14	3.27	3.39	3.52	3.64	3.77	16	3.35	3.49	3.63	3.91	4.05	
17	2.95	3.08	3.20	3.31	3.43	3.55	17	3.15	3.29	3.42	3.68	3.81	
18	2.79	2.90	3.02	3.13	3.24	3.35	18	2.98	3.10	3.23	3.47	3.59	
19	2.65	2.75	2.85	2.96	3.07	3.17	19	2.82	2.99	3.06	3.29	3.41	
20	2.51	2.61	2.70	2.82	2.92	3.02	20	2.68	2.79	2.90	3.13	3.24	
21	2.40	2.49	2.58	2.68	2.78	2.87	21	2.55	2.66	2.77	2.98	3.08	
22	2.28	2.38	2.47	2.56	2.65	2.74	22	2.44	2.54	2.64	2.84	2.95	
23	2.19	2.27	2.36	2.45	2.54	2.62	23	2.33	2.43	2.53	2.72	2.82	
24	2.10	2.18	2.26	2.35	2.44	2.51	24	2.24	2.33	2.42	2.61	2.69	
25	2.01	2.09	2.17	2.25	2.33	2.41	25	2.15	2.23	2.32	2.50	2.59	
26	1.93	2.01	2.09	2.17	2.24	2.32	26	2.06	2.15	2.23	2.41	2.49	
27	1.86	1.94	2.01	2.09	2.16	2.23	27	1.99	2.07	2.15	2.32	2.40	
28	1.80	1.87	1.94	2.01	2.08	2.15	28	1.92	2.00	2.08	2.23	2.31	
29	1.73	1.80	1.87	1.94	2.01	2.08	29	1.85	1.93	2.00	2.16	2.23	
30	1.68	1.74	1.81	1.88	1.94	2.01	30	1.79	1.86	1.94	2.09	2.16	

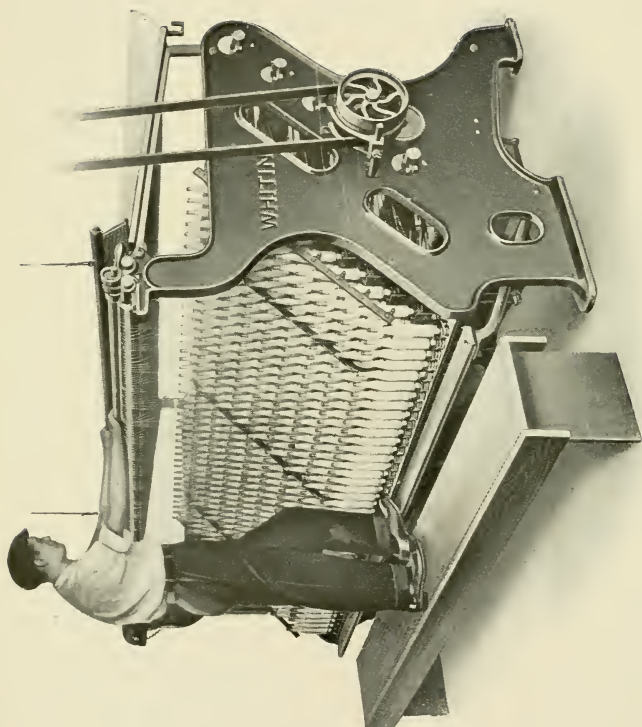
**Note**—Results in pounds per spindle per day of ten hours. Allowance is made in above table for doffing, etc.

# Reel Production Tables. Continued.

72 IN. REEL. Revolutions per Minute.										90 IN. REEL. Revolutions per Minute.									
No. Varn.	110	115	120	125	130	135	140	105	110	115	120	125	No. Varn.						
1	58.93	61.61	64.29	66.97	69.65	72.33	66.97	70.31	73.66	77.01	80.36	83.71	1						
2	29.47	30.81	32.15	33.49	34.83	36.16	33.49	35.16	36.83	38.51	40.18	41.86	2						
3	19.65	20.54	21.43	22.33	23.22	24.11	22.32	23.44	24.56	25.67	26.78	27.90	3						
4	14.74	15.40	16.07	16.74	17.41	18.08	16.74	17.58	18.42	19.26	20.09	20.93	4						
5	11.79	12.32	12.86	13.40	13.93	14.47	13.40	14.06	14.73	15.40	16.07	16.74	5						
6	9.82	10.27	10.72	11.16	11.61	12.05	11.16	11.72	12.33	12.84	13.40	13.95	6						
7	8.42	8.73	9.19	9.57	9.95	10.33	9.57	10.05	10.53	11.00	11.48	11.96	7						
8	7.37	7.70	8.04	8.37	8.71	9.04	8.37	8.79	9.21	9.63	10.05	10.47	8						
9	6.55	6.85	7.15	7.44	7.74	8.04	7.44	7.81	8.19	8.56	8.93	9.30	9						
10	5.90	6.16	6.43	6.70	6.97	7.23	6.70	7.03	7.37	7.70	8.04	8.37	10						
11	5.36	5.60	5.85	6.09	6.33	6.58	6.09	6.39	6.70	7.00	7.31	7.61	11						
12	4.91	5.14	5.36	5.58	5.81	6.03	5.58	5.86	6.14	6.42	6.70	6.98	12						
13	4.54	4.74	4.95	5.15	5.36	5.57	5.15	5.41	5.66	5.93	6.18	6.44	13						
14	4.21	4.40	4.59	4.79	4.97	5.17	4.79	5.03	5.26	5.50	5.74	5.98	14						
15	3.93	4.11	4.29	4.47	4.64	4.82	4.47	4.69	4.91	5.14	5.36	5.58	15						
16	3.69	3.85	4.02	4.19	4.36	4.52	4.19	4.40	4.61	4.82	5.02	5.23	16						
17	3.47	3.63	3.78	3.94	4.20	4.26	3.94	4.14	4.34	4.53	4.73	4.93	17						
18	3.28	3.43	3.57	3.72	3.87	4.02	3.72	3.91	4.09	4.28	4.47	4.65	18						
19	3.10	3.24	3.39	3.53	3.67	3.81	3.53	3.70	3.88	4.05	4.23	4.41	19						
20	2.95	3.08	3.22	3.35	3.49	3.62	3.35	3.52	3.69	3.85	4.02	4.19	20						
21	2.81	2.94	3.06	3.19	3.32	3.45	3.19	3.35	3.51	3.67	3.83	3.99	21						
22	2.68	2.80	2.92	3.05	3.17	3.29	3.05	3.20	3.35	3.50	3.66	3.81	22						
23	2.56	2.68	2.80	2.91	3.03	3.15	2.91	3.06	3.21	3.35	3.50	3.64	23						
24	2.46	2.57	2.68	2.79	2.90	3.02	2.79	2.93	3.07	3.21	3.35	3.49	24						
25	2.36	2.47	2.57	2.68	2.79	2.90	2.68	2.81	2.95	3.08	3.22	3.35	25						
26	2.27	2.37	2.47	2.58	2.68	2.78	2.58	2.71	2.84	2.96	3.09	3.22	26						
27	2.19	2.28	2.38	2.48	2.58	2.68	2.48	2.61	2.73	2.85	2.98	3.10	27						
28	2.11	2.20	2.30	2.39	2.49	2.58	2.39	2.51	2.63	2.75	2.87	2.99	28						
29	2.03	2.13	2.22	2.31	2.40	2.50	2.31	2.43	2.54	2.66	2.77	2.89	29						
30	1.97	2.06	2.15	2.23	2.32	2.41	2.23	2.35	2.46	2.57	2.68	2.79	30						

Note:—Results in pounds per spindle per day of ten hours. Allowance is made in above table for doffing, etc.

# QUILLING



Quilling Machine



## THE WHITIN LONG-CHAIN QUILLING MACHINE

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**This machine** has merited recognition as an important factor in the field of textile manufacturing. Through years of development and service, it has demonstrated its merit and adaptability to classes of work for which the ordinary skein process of quilling cannot be advantageously employed. It has further proven its efficiency and economy in quilling satisfactorily, all sizes of colored, bleached and mercerized yarns, also single or double yarns for braiders.

The machine is manufactured with the best of tools and equipment, by skilled workmen and under efficient management. The excellence of its design is therefore supplemented by the highest grade of workmanship while all materials used in its construction are carefully selected and of the best quality.

Since the introduction of our **Quilling Machine** to the textile industry, the long-chain process of finishing yarns has come into almost universal use in velvet, plush, bleached, colored and mercerized yarn mills. This process, in comparison with the methods still in use in some mills, of winding from a short-skein, has a number of essential points in its favor, among which may be mentioned:

**First:** The labor expense of preparing the yarn for bleaching, dyeing or mercerizing is greatly reduced.

**Second:** The yarn dyed in a long-chain takes a more even shade, showing more lustre and bloom than in the skein process.

**Third:** The yarn is wound direct from the chain onto bobbin or quill, ready for braiding or weaving without any intermediate process.

**Fourth:** The avoidance of burnt or burnished yarn, whereby the strength as well as the original brightness and clearness of the yarn is fully maintained.

**Fifth:** There is practically no waste in winding, and substantial savings are made in the cost of production, floor space occupied, and power consumed.

**Sixth:** The trouble due to "double filling" on re-wound bobbins is to a great extent eliminated. Should a "double" occur on our machine, the quill or bobbin will build correspondingly larger diameter, rendering it impossible to place the bobbin in the shuttle. In the skein winder a "double" does not alter the appearance of the bobbin, and the weaver, not noticing the defect, places the bobbin in the shuttle, with the results of a "pick-out" in the cloth, and the consequent loss of the weaver's time and the impairment to the quality of the cloth being woven.

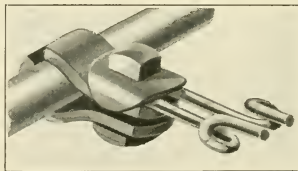
**Seventh:** Lapped ends cannot be made, consequently bobbins wound on this machine will weave or unwind from start to finish without break of yarn, and also without leaving any waste on the bobbin.

**The Whitin Quilling Machine** is a rigidly constructed frame, consisting of two end standards connected together by bolster rails and tie rods, supported by one or more intermediate sampsons. The bolster or spindle rails are arranged in either 5, 6 or 9 tiers, each tier being fitted with from 25 to 42 spindles, according to model of frame. **The Spindles**, which are

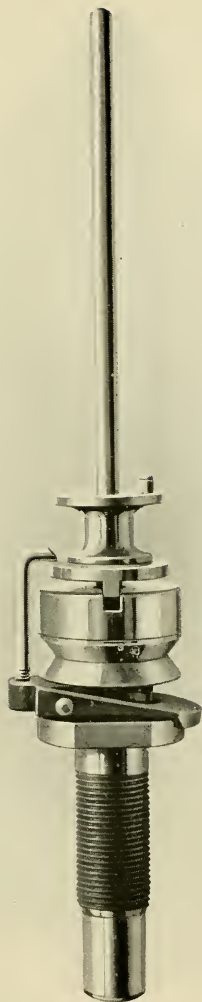
driven by bands from cylinders in back of frame, may be either our common positively driven type, with bobbin friction drive, or, if preferred, the Holt and Seeley **patented spindle**. The former is best adapted for the coarser counts of yarn, whose strength would not be materially affected by the increasing tension due to the increasing weight of yarn in winding from empty to full bobbin. With this type of spindle the bobbin is supported on a loose collar which is frictionally driven from



**Common Spindle**

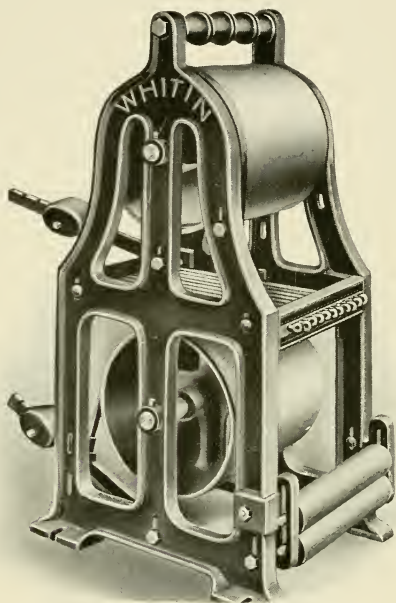


**Yarn Guide**



HOLT SPINDLE

the spindle by means of a friction washer of flannel or felt interposed between the collar and top of spindle whirl. The amount of tension imparted depends on the weights and sizes of washer and collar, and also the weight of the yarn on bobbin. Owing to the peculiar construction of the **Holt**



**Friction Drums**

**spindle**, the tension of the yarn is not affected by the weight of yarn on bobbin, for the reason that the bobbin is supported by the spindle, which is frictionally driven through a tension collar and a felt or flannel washer by a whirl loosely mounted on the bolster casing. By this construction a constant, predetermined tension is imparted to the yarn, irrespective of the weight of the bobbin, thus rendering this spindle particularly adapted for winding fine, delicate yarns. The spindles are made to order to fit bobbins suitable for the work required.

In front of each tier of spindles is a guide wire rod holding guide wires of hardened steel for each spindle. The rods are supported by inclined bars fastened to the lifting rods of the **builder motion**, which controls the length of traverse and style of wind on the bobbins. This motion is so designed that bobbins may be made for filling wind, warp wind, long straight wind, long wind with taper top, or long wind reversed. The motion has a quick return, which securely binds the yarn on the bobbin, thereby forming a very solid and compact bobbin, suitable for subsequent processes.

**The shipping motion** is operated by the foot of the operative, leaving both hands free for vibrating the reed to separate stuck ends as they come along in the chain of yarn.

The machine has no complicated mechanisms, one operative easily tending a machine of 378 spindles.

In operation, the **chain of yarn** to be quilled is drawn from a turntable over friction bars to friction drums, stationed about thirty feet from the frame, which allows sufficient spread to the yarn, and also gives the operative an opportunity to readily detect a lease or broken end as it is being drawn up, when the machine may be stopped to remedy the defect. The yarn passes through the suspended reed, to which the operative occasionally gives a backward and forward motion for the purpose of separating the ends that may be stuck together, thus preventing breakage of the yarn. From the reed the yarn is drawn under a cloth-covered friction roll, which also serves to catch loose ends. Thence the yarn passes to the guide wires, and is wound upon the bobbins.

Previous to doffing the bobbins the yarn is depressed by the operative by means of our patented **doffing mechanism** to a position below the upper flange of the bobbin collars, and then a few coils of yarn are wound thereon, for the purpose of holding the ends preparatory to starting a new set of bobbins. From time to time the waste yarn collecting on this collar can be readily removed by cutting with a knife along the groove in collar provided for this purpose.

**The pulleys** are 10 inches in diameter by 2 inches face; speed, 300 to 380 revolutions per minute.

**Horse Power:** 378 spindles,  $2\frac{1}{2}$  inch space machine, consumes 2 horse power at 350 revolutions per minute of driving pulley.

### **Weights: (Model F Machine)**

#### **Domestic:**

Net. 3375 pounds,  
Gross, 3815 pounds,

#### **Export:**

Gross, 4350 pounds,  
Cubic Feet, 150.

To suit the varied requirements of the trade in the matter of sizes and styles of bobbins to be quilled, our machines are made in **five standard models**, as follows:

Model	Space	Size of Bobbin		Number of Spindles	Length Overall
		Diam.	Traverse		
A	2½ in.	1¾ in.	9 in.	378	10 ft., 10 in.
F	3 in.	2 in.	10 in.	378	12 ft., 10 in.
M	3½ in.	2 in.	10 in.	378	13 ft., 6 in.
L	4½ in.	3 in.	6 in.	304	16 ft., 4½ in.
P	5 in.	4 in.	6 in.	168	11 ft., 5 in.

For width, see floor plan on page 286.

In regard to the **production table**, given herewith, we have been governed entirely by the results reported by the various mills using these machines. We have found more or less divergence in the results obtained, owing to the particular conditions and processes under which each mill works up its product. However, for purposes of comparison, we have averaged all the results together for the reason that in the same mill we have found little difference in production on the same actual number, whether the yarn was in the gray, mercerized, colored, bleached or in ply.

In the last column, we have given a proportionate list of productions which would seem fair under the best conditions. We would caution mills, however, in making comparison with these estimated figures, as a number of conditions arise which would limit their production, among which we might mention:—

1. Expertness of help.
2. The condition, length and strength of the warps as delivered to the Quilling Machine.
3. If dyed, the color of the warp.
4. The size and traverse of the quill.

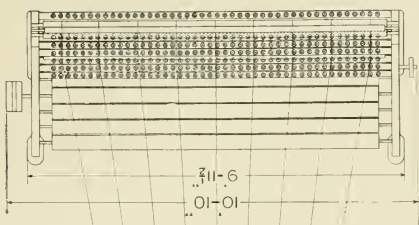
In brief, this table is only approximate, but, as such, we believe has value, if taken and considered in reference to the particular conditions of each mill.

# PRODUCTION TABLE

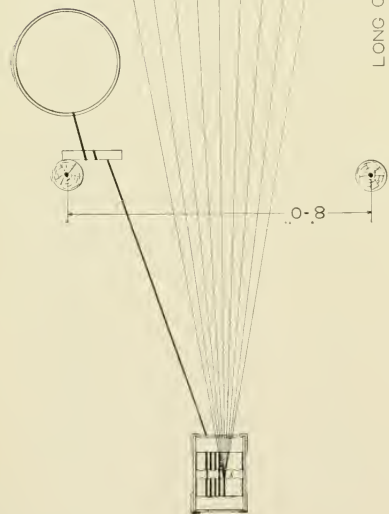
NUMBER OF POUNDS QUILLING PER DAY OF TEN HOURS  
378 SPINDLE MACHINE.

Number of yarn	Highest lbs.	Lowest lbs.	Averages obtained lbs.	A Fair Average lbs.
5's	370	275	305	400
6's	400	400	400	400
7's	300	300	300	400
8's	450	300	375	400
9's	391	391	394	400
10's	550	225	398	400
11's	409	344	377	375
12's	410	273	317	350
13's	333	180	260	325
14's	400	225	300	300
15's	425	170	286	280
16's	360	165	263	270
17's	260	246	253	260
18's	300	225	255	255
20's	330	110	236	250
22's	230	210	220	230
24's	200	125	163	210
25's	280	216	249	200
26's	190	138	169	190
27's	140	140	140	180
28's	120	112	116	170
30's	240	110	158	155
32's	150	150	150	150
33's	155	155	155	145
35's	180	118	149	140
36's	140	115	126	135
38's	130	120	125	125
40's	120	112	116	115
45's	110	100	105	105
50's	100	76	88	90
60's	80	80	80	80
65's	75	70	72	75
70's	70	50	60	60
80's	60	40	50	50





PLAN  
OF  
LONG CHAIN QUILLER  
AND  
CONNECTIONS.  
378 SPINDLES, 2 $\frac{1}{2}$  SPACE.



ELEVATION.

## CARE OF QUILLING MACHINES

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In order to obtain the best results, both in the quality and quantity of quilled work, it is absolutely necessary that all parts of the machine be kept as clean as possible. The cleaning of the machines should be carefully attended to, especially in removing lint and oil that collects around the parts with which the yarn comes in contact. Waste must be kept away from the spindle and friction washer, as a soft quill would be formed if a small piece of waste should catch under the spindle cap.

At regular intervals the old oil should be pumped out of the spindle bolsters and refilled with a good light oil. Care should be taken not to get too much oil in the bolsters, or the yarn will be stained by the oil thrown by the spindle.

Bands should be made of good strong roving, about 100 to the pound, and not put on too tightly.

Guide wires should be carefully examined and renewed when badly worn.

Badly fitted quills or bobbins are the cause of considerable trouble, therefore the greatest care should be exercised in their selection. Whenever an end breaks and runs in double, the operator should pull it back, for if this is not done, faulty work will result.

In piecing up, the operator should be careful to hold the ends tightly until all slack is taken up, otherwise the yarn is wound on slack and will slub off in the loom, resulting in poor cloth.

## Repairs.

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We have issued for the convenience of users of our machinery, **Illustrated Circulars of the Component Parts** of each machine which we build. The various pieces are illustrated in a clear manner, numbered and named, so that if the directions for ordering repairs, as stated in circulars, are followed there will be no doubt but what the orders will be correctly filled, with the least possible delay. Copies of these circulars have been sent to all our customers, and extra copies will be sent on application.

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## The Hands of Machines.

To determine the **Hands** of our **Machines**, face the delivery and note which hand side the driving pulleys are.

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## Shipping Directions.

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We prefer our customers to furnish directions for shipping their orders, but if not given and the package is small, we send by express, if large by freight, selecting the most reliable routes and the lowest freight rates that can be secured.

# MISCELLANEOUS

# RULES FOR CALCULATING THE SPEED OF GEARS OR PULLEYS.

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In calculating for gears, multiply or divide by the diameter or the number of teeth, as may be required. In calculating for pulleys, multiply or divide by their diameters in inches.

The driving wheel is called the *driver*, and the driven wheel the *driven* or *follower*.

## Problem I.

*The revolutions of driver and driven, and the diameter of the driven, being given, required the diameter of the driver.*

**Rule.**—Multiply the diameter of the driven by its number of revolutions, and divide by the number of revolutions of the driver.

## Problem II.

*The diameter and revolutions of the driver being given, required the diameter of the driven to make a given number of revolutions in the same time.*

**Rule.**—Multiply the diameter of the driver by its number of revolutions, and divide the product by the required number of revolutions.

## Problem III.

*The diameter or number of teeth, and number of revolutions of the driver, with the diameter or number of teeth of the driven, being given, required the revolutions of the driven.*

**Rule.**—Multiply the diameter or number of teeth of the driver by its number of revolutions, and divide by the diameter or number of teeth of the driven.

## Problem IV.

*The diameter of driver and driven, and the number of revolutions of the driven, being given, required the number of revolutions of the driver.*

**Rule.**—Multiply the diameter of the driven by its number of revolutions, and divide by the diameter of the driver.

*To find the width of belt and diameter of shaft to transmit a stated horse power at a given speed, the following Harpers' short formulae are convenient:*

### Leather Belts.

Single belting — 1"-2"-3"-4"-5"-6"-7"-8"-9"-10"-12"-15"-18" wide will transmit  $\frac{1}{8}$  -  $\frac{1}{4}$  -  $\frac{3}{8}$  -  $\frac{1}{2}$  -  $\frac{5}{8}$  -  $\frac{3}{4}$  -  $\frac{7}{8}$  - 1 -  $1\frac{1}{8}$  -  $1\frac{1}{4}$  -  $1\frac{1}{2}$  -  $1\frac{7}{8}$  -  $2\frac{1}{4}$  H. P. for every 100 feet of velocity per minute. Double belts transmit  $1\frac{1}{2}$  times as much as single belts.

### Rope Driving.

One rope —  $\frac{3}{4}$ " - 1" -  $1\frac{1}{4}$ " -  $1\frac{1}{2}$ " -  $1\frac{3}{4}$ " - 2" diameter will transmit  $\frac{1}{8}$  -  $\frac{1}{4}$  -  $\frac{2}{5}$  -  $\frac{3}{5}$  -  $\frac{4}{5}$  - 1 horse power for every 100 feet of velocity per minute.

### Shafting.

Steel Shafting —  $1\frac{1}{2}$ " - 2" -  $2\frac{1}{2}$ " - 3" -  $3\frac{1}{2}$ " - 4" -  $4\frac{1}{2}$ " - 5" -  $5\frac{1}{2}$ " - 6" diameter will transmit  $\frac{1}{2}$  -  $1\frac{1}{8}$  -  $2\frac{1}{4}$  -  $3\frac{7}{8}$  - 6 - 9 - 13 - 18 - 24 - 31 horse power for every ten revolutions per minute.

*To ascertain any length of belt required:*

Take twice the distance from centre to centre of shafting and add half the circumference of each pulley.

*To determine the length of belt when changing the size of one of the pulleys:*

Take the difference between the diameters of the two pulleys, and one-half the difference, and add to length if the change is to a larger pulley, and subtract from length if the change is to a smaller pulley.

*To determine the length of cross belts:*

Square the diameter of the large pulley and the distance between centers; add together and extract the square root.

Square the diameter of the small pulley and the distance between centers; add together and extract the square root.

To the sum of the two roots add one-half the circumference of the two pulleys, and the total will be the required length.

## NOTES ON BELTING

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In the location of shafts that are to be connected with each other by belts, care should be taken to have a proper distance between them. This distance should be such as to allow of a gentle sag to the belt when in motion.

A general rule for this distance is as follows: 15 feet is a good average where narrow belts are to run over small pulleys, the belt having a sag of  $1\frac{1}{2}$  to 2 inches.

For larger belts working on larger pulleys, a distance of 20 to 25 feet is proper.

For main belts working on very large pulleys, the distance should be 25 to 30 feet, the belts working well with a sag of 4 or 5 inches.

If too great a distance is attempted, the weight of the belt will produce a very heavy sag, drawing so hard on the shaft as to produce great friction in the bearings, while at the same time the belt will have an unsteady flapping motion which will in a short time destroy both belt and machinery.

Connected shafts should never be placed one directly over the other if possible to avoid it, as in such case the belt must be kept very tight to do the work.

The diameter of pulleys should be as large as possible, provided they do not produce a belt speed exceeding 3000 feet per minute.

Never add to the work of a belt so much as to overload it.

Single belts should be put on so as to run with the grain, or hair side, next to the pulleys, and so the points of the laps will run against the pulleys, as the laps on the outside of a belt are most liable to come apart when the points are run against the atmospheric pressure.

Double belts should be put on so that the points of the laps will run with the pulleys, as both sides point in the same direction.

Belts should be kept clean and free from accumulations of dust and grease, and particularly from contact with lubricating oils, some of which permanently injure leather.

Leather belts must be well protected against water, and even moisture.

Belts should be kept soft and pliable.



# EQUIVALENTS OF YARN COUNTS

120 Yds. Weigh Grains	Woolen Runs	Woolen Cuts	Worsted Number	Linen Leas	Cotton Counts	120 Yds. Weigh Grains	Woolen Runs	Woolen Cuts	Worsted Number	Linen Leas	Cotton Counts
2100	$\frac{1}{4}$	$1\frac{1}{8}$	.71	1.33	.48	87.48	6	32	17.14	32	11.43
1050	$\frac{1}{2}$	$2\frac{2}{8}$	1.43	2.67	.95	84.	$6\frac{1}{4}$	$33\frac{1}{8}$	17.85	33.33	11.90
699.96	$\frac{3}{4}$	4	2.14	4	1.43	80.76	$6\frac{1}{2}$	$34\frac{2}{8}$	18.57	34.67	12.38
525.	1	$5\frac{1}{8}$	2.86	5.33	1.90	77.76	$6\frac{3}{4}$	36	19.28	36.	12.86
420.	$1\frac{1}{4}$	$6\frac{2}{8}$	3.57	6.67	2.39	75.	7	$37\frac{1}{8}$	20.	37.33	13.33
349.99	$1\frac{1}{2}$	8	4.28	8.	2.86	72.41	$7\frac{1}{4}$	$38\frac{2}{8}$	20.71	38.67	13.81
300.	$1\frac{3}{4}$	$9\frac{1}{8}$	5.	9.33	3.33	69.98	$7\frac{1}{2}$	40	21.43	40.	14.29
262.49	2	$10\frac{2}{8}$	5.71	10.67	3.81	67.73	$7\frac{3}{4}$	$41\frac{1}{8}$	22.14	41.33	14.76
232.23	$2\frac{1}{4}$	12	6.43	12.	4.29	65.62	8	$42\frac{2}{8}$	22.85	42.67	15.24
210	$2\frac{1}{2}$	$13\frac{1}{8}$	7.14	13.33	4.76	63.62	$8\frac{1}{4}$	44	23.57	44.	15.71
190.85	$2\frac{3}{4}$	$14\frac{2}{8}$	7.85	14.67	5.24	61.75	$8\frac{1}{2}$	$45\frac{1}{8}$	24.28	45.33	16.19
174.98	3	16	8.57	16.	5.71	60.	$8\frac{3}{4}$	$46\frac{2}{8}$	25.	46.67	16.67
161.52	$3\frac{1}{4}$	$17\frac{1}{8}$	9.28	17.33	6.17	58.32	9	48	25.71	48.	17.24
150.	$3\frac{1}{2}$	$18\frac{2}{8}$	10.	18.67	6.67	56.76	$9\frac{1}{4}$	$49\frac{1}{8}$	26.43	49.33	17.62
139.99	$3\frac{3}{4}$	20	10.71	20.	7.14	55.25	$9\frac{1}{2}$	$50\frac{2}{8}$	27.14	50.67	18.96
131.26	4	$21\frac{1}{8}$	11.43	21.33	7.62	53.83	$9\frac{3}{4}$	52	27.85	52.	18.57
123.53	$4\frac{1}{4}$	$22\frac{2}{8}$	12.14	22.67	8.10	52.49	10	$53\frac{1}{8}$	28.57	53.33	19.48
116.67	$4\frac{1}{2}$	24	12.85	24.	8.57	51.22	$10\frac{1}{4}$	$54\frac{2}{8}$	29.28	54.67	19.52
110.52	$4\frac{3}{4}$	$25\frac{1}{8}$	13.57	25.33	9.05						
105.	5	$26\frac{2}{8}$	14.28	26.67	9.52						
99.98	$5\frac{1}{4}$	28	15.	28.	10.						
95.45	$5\frac{1}{2}$	$29\frac{1}{8}$	15.71	29.33	10.47						
91.30	$5\frac{3}{4}$	$30\frac{2}{8}$	16.43	30.67	10.95						

## APPROXIMATE POWER CONSUMED BY COTTON MACHINERY

The Power Required to drive Cotton Machinery varies according to the speed and production of the machines. The following may be taken as a fair average:

Willow . . . . .				7	H. P.
Bale Breaker . . . . .				5	"
Single Beater Picker . . . . .				4	"
Double Beater Picker . . . . .				8	"
Self-Feeder . . . . .				1 $\frac{1}{2}$	"
Roller Card . . . . .				2 to 3	"
Revolving Flat Card . . . . .				$\frac{3}{4}$ to 1 $\frac{1}{2}$	"
Sliver Lap Machine . . . . .				$\frac{1}{2}$	"
Ribbon Lap Machine . . . . .				1	"
Comber, 8 Heads . . . . .				$\frac{1}{2}$	"
Drawing Frame, per delivery . . . . .				$\frac{1}{4}$	"
Slubber Fly Frame . . . . .	48 Spindles per				"
Intermediate Fly Frame . . . . .	60	"			"
Fine Fly Frame . . . . .	90	"	"		"
Jack Fly Frame . . . . .	110	"	"		"
Spinning Frame, Medium No. 1 Gravity					
Spindle, 8,500 Revolutions . . . . .	55	"	"		"
Spinning Frame, Standard No. 1 Gravity					
Spindle, 9,700 Revolutions . . . . .	65	"	"		"
Spooler . . . . .	200	"	"		"
Mule Spindle, 9,600 Revolutions . . . . .	130	"	"		"
Quiller . . . . .	190	"	"		"
Twister Spindle, 6,500 Revolutions . . . . .	40	"	"		"
Warper . . . . .				$\frac{1}{6}$ to $\frac{1}{4}$	"
Slasher . . . . .				1 $\frac{1}{2}$ to 2	"
Loom . . . . .				$\frac{1}{6}$ to $\frac{1}{3}$	"
Wide Loom . . . . .				1	"
Yarn Reel, 50 Spindles . . . . .				$\frac{1}{6}$	"
Brusher and Shearer . . . . .				3	"
Folder . . . . .				$\frac{1}{8}$	"
Screw Press . . . . .				$\frac{1}{2}$	"
Engine Lathe . . . . .				$\frac{1}{5}$ to $\frac{3}{4}$	"
Upright Drill . . . . .				$\frac{1}{6}$	"

# DECIMAL EQUIVALENTS OF FRACTIONS OF AN INCH.

$\frac{1}{32}$	0.03125	$\frac{9}{32}$	0.28125	$\frac{17}{32}$	0.53125	$\frac{25}{32}$	0.78125
$\frac{1}{16}$	0.0625	$\frac{5}{16}$	0.3125	$\frac{9}{16}$	0.5625	$\frac{13}{16}$	0.8125
$\frac{3}{32}$	0.09375	$\frac{11}{32}$	0.34375	$\frac{19}{32}$	0.59375	$\frac{27}{32}$	0.84375
$\frac{1}{8}$	0.125	$\frac{3}{8}$	0.375	$\frac{5}{8}$	0.625	$\frac{7}{8}$	0.875
$\frac{5}{32}$	0.15625	$\frac{13}{32}$	0.40625	$\frac{21}{32}$	0.65625	$\frac{29}{32}$	0.90625
$\frac{3}{16}$	0.1875	$\frac{7}{16}$	0.4375	$\frac{11}{16}$	0.6875	$\frac{15}{16}$	0.9375
$\frac{7}{32}$	0.21875	$\frac{15}{32}$	0.46875	$\frac{23}{32}$	0.71875	$\frac{31}{32}$	0.96875
$\frac{1}{4}$	0.25	$\frac{1}{2}$	0.5	$\frac{3}{4}$	0.75	1	1.0

# CIRCUMFERENCES OF CIRCLES ADVANCING BY 8ths.

Diameter	CIRCUMFERENCES							
	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0		0.3927	0.7854	1.178	1.570	1.963	2.356	2.748
1	3.141	3.534	3.927	4.319	4.712	5.105	5.497	5.890
2	6.283	6.675	7.068	7.461	7.854	8.246	8.639	9.032
3	9.424	9.817	10.21	10.60	10.99	11.38	11.78	12.17
4	12.56	12.95	13.35	13.74	14.13	14.52	14.92	15.31
5	15.70	16.10	16.49	16.88	17.27	17.67	18.06	18.45
6	18.84	19.24	19.63	20.02	20.42	20.81	21.20	21.59
7	21.99	22.38	22.77	23.16	23.56	23.95	24.34	24.74
8	25.13	25.52	25.91	26.31	26.70	27.09	27.48	27.88
9	28.27	28.66	29.05	29.45	29.84	30.23	30.63	31.02
10	31.41	31.80	32.20	32.59	32.98	33.37	33.77	34.16

Diameter of a circle  $\times$  3.1416 = the circumference

## CONVENIENT MULTIPLIERS.

### Circles, Areas and Figures.

Diameter of a circle  $\times 3.1416$  or  $\frac{\pi}{2}$  = the circumference.  
Circumference of a circle  $\times 0.31831$  or  $\frac{2}{\pi}$  = the diameter.  
Square of diameter  $\times 0.7854$  = the area of the circle.  
Square of diameter  $\times \frac{1}{4}$  = the area of the circle.  
Square root of area  $\times 1.12837$  = the diameter of a circle.  
Radius of circle  $\times 6.28318$  = the circumference.  
Circumference =  $3.5449 \times \sqrt{\text{area of circle}}$ .  
Diameter of a circle  $\times 0.8862$  = the side of an equal square.  
Side of a square  $\times 1.128$  = the diameter of an equal circle.  
Area of a triangle = the base  $\times \frac{1}{2}$  the perpendicular height.  
Square of the diameter of a sphere  $\times 3.1416$  = the convex surface.  
Cube of the diameter of a sphere  $\times 0.5236$  = the solidity.  
Diameter of a sphere  $\times 0.806$  = the edge of an equal cube.  
Diameter of a sphere  $\times 0.6667$  = the length of an equal cylinder.  
Surface of a cylinder = area of both ends + length  $\times$  circumference  
Solidity of a cylinder = area of one end  $\times$  the length.  
Solidity of a cone = area of the base  $\times \frac{1}{3}$  the perpendicular height.  
Area of an ellipse = long axis  $\times$  short axis  $\times 0.7854$ .

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### Conversion of one Denomination to another.

Feet  $\times 0.00019$  = miles.  
Yards  $\times 0.0006$  = miles.  
Square inches  $\times 0.00694$  = square feet.  
Square feet  $\times 144$  = square inches  
Cubic feet  $\times 0.037$  = cubic yards.  
Cubic inches  $\times 0.000579$  = cubic feet.  
Cubic feet  $\times 6.2355$  = gallons.  
Gallons  $\times 0.16059$  = cubic feet.  
Gallons  $\times 10$  = lbs. of distilled water.  
Cubic feet of water  $\times 62.425$  = lbs. avoirdupois.  
Cubic inches of water  $\times 0.03612$  = lbs. avoirdupois.  
Lbs. avoirdupois  $\times 1.2153$  = lbs. Troy or apothecary.  
Lbs. Troy or apothecary  $\times 0.8228$  = lbs. avoirdupois.  
Lbs. avoirdupois  $\times 0.00893$  = cwt.  
Lbs. avoirdupois  $\times 0.000447$  = tons.  
Tons of water  $\times 224$  = gallons.

## HOW TO ASCERTAIN HORSEPOWER OF BOILERS.

Standard adopted by American Society of Mechanical Engineers is 30 pounds of water evaporated into dry steam per hour from temperature of feed water 100° Fahrenheit, into steam of 70 pounds pressure.

Compound engines will develop a horsepower on 15 pounds of water.

Single condensing engine will develop a horsepower on 18 to 22 pounds of water.

Automatic non-condensing engine will develop a horsepower on 28 to 32 pounds of water.

Slide-valve throttle-governing engine will develop a horsepower on one cubic foot, or 62½ pounds of water.

## STEAM MEMORANDA.

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into one cubic foot of steam (approximately).

The specific gravity of steam (at atmospheric pressure) is .411 that of air at 34° Fahrenheit, and .0006 that of water at same temperature.

27.222 cubic feet of steam weigh one pound; 13.817 cubic feet of air weigh one pound.

Locomotives average a consumption of 3,000 gallons of water per 100 miles run.

The best designed boilers, well set, with good draft, and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal.

On one square foot of grate can be burned on an average from 10 to 12 pounds of hard coal, or 18 to 20 pounds of soft coal, per hour, with natural draft. With forced draft nearly double these amounts can be burned.

Steam engines, in economy, vary from 14 to 60 pounds of feed water, and from 1½ to 7 pounds of coal per hour per indicated horsepower.

Condensing engines require from 20 to 30 gallons of water, at an average low temperature, to condense the steam represented by every gallon of water evaporated in the boilers supplying the engines—approximately for most engines, we say, from 1 to 1½ gallons condensing water per minute, per indicated horsepower.

## HORSEPOWER OF AN ENGINE.

a = Area of the piston in square inches.

p = Mean effective pressure of the steam on the piston per square inch.

v = Velocity of piston per minute.

$$\text{Then H. P.} = \frac{a \times p \times v}{33,000}$$

The mean pressure in the cylinder when cutting off at

1/4 stroke	=	boiler pressure multiplied by	.597
1/3 "	=	" "	.670
3/8 "	=	" "	.743
1/2 "	=	" "	.847
5/8 "	=	" "	.919
2/3 "	=	" "	.937
3/4 "	=	" "	.966
7/8 "	=	" "	.992

To find the diameter of a cylinder of an engine of a required nominal horsepower:

$$\frac{5500}{v} \text{—multiplied by H. P. = a.}$$

v

## WATER MEMORANDA.

Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. Approximately, we say that every foot elevation is equal to  $\frac{1}{2}$  pound pressure per square inch; this allows for ordinary friction.

To find the diameter of a pump cylinder to remove a given quantity of water per minute (100 feet of piston being the standard of speed), divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find quantity of water elevated in one minute, running at 100 feet of piston speed per minute, square the diameter of the water cylinder in inches, and multiply by 4.

To find the horsepower necessary to elevate water to a given height, multiply the weight of the water elevated per minute in pounds by the height in feet, and divide the product by 33,000 (an allowance should be added for water friction, and a further allowance for loss in steam cylinder, say from 20 to 30 per cent).

The area of the steam piston, multiplied by the steam pressure, gives the total amount of pressure that can be exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance to move the pistons at the required speed, say from 20 to 40 per cent, according to speed and other conditions.

To find the capacity of a cylinder in gallons, multiply the area in inches by the length of stroke in inches, will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a U. S. gallon in inches), and product is the capacity in gallons.

## ELECTRICAL UNITS.

*Volt*—The unit of electrical motive force. Force required to send one ampere of current through one ohm of resistance.

*Ohm*—Unit of resistance. The resistance offered to the passage of one ampere when impelled by one volt.

*Ampere*—Unit of current. The current which one volt can send through a resistance of one ohm.

*Watt*—The unit of electrical energy, and is the product of ampere and volt. That is, one ampere of current flowing under a pressure of one volt gives one watt of energy.

One electrical horsepower is equal to 746 watts.

One Kilowatt is equal to 1,000 watts.

To find the watts consumed in a given electrical circuit, such as a lamp, multiply the volts by the amperes.

To find the volts, divide the watts by the amperes.

To find the amperes, divide the watts by the volts.

To find the electrical horsepower required by a lamp, divide the watts of the lamp by 746.

To find the number of lamps that can be supplied by one electrical horsepower of energy, divide 746 by the watts of the lamp.

To find the electrical horsepower necessary, multiply the watts per lamp by the number of lamps, and divide by 746.

To find the mechanical horsepower necessary to generate the required electrical horsepower, divide the latter by the efficiency of the generator.

To find the amperes of a given circuit, of which the volts and ohms resistance are known, divide the volts by the ohms.

To find the volts, when the amperes and watts are known, multiply the amperes by the ohms.

To find the resistance in ohms, when the volts and amperes are known, divide the volts by the amperes.

## USEFUL DATA

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1 Pint of water weighs a pound and a quarter.

1 Gallon of water = .1605 cubic feet = 10 lb. of water at 62° F.

1 Knot = 6080 feet = 1.15 statute miles.

1 Mile = 5280 feet.

1 Pound (Avoirdupois) = 7000 grains = 453.6 grammes.

1 Pound (Troy) = 5,760 grains.

1 horse power = 33,000 foot lbs. of work done per min. = 746 watts.

1 French horse power or force de cheval = 4500 kilogrammetres per min. = .9863 English horse power.

1 English horse power = 1.01385 French force de cheval.

The pressure of one atmosphere = 14.7 lbs. per square inch = 2116 lbs. per square foot = a column of mercury 760 m/m high.

A column of water 2.3 feet high corresponds to a pressure of 1 lb. per square inch.

Cubic inches of cast iron  $\times 0.26$  = lbs. Avoirdupois.

Cubic inches of wrought iron  $\times 0.28$  = lbs. Avoirdupois.

Thickness of wrought iron plate in inches  $\times 40$  = lbs. per square foot.

Sectional area of wrought iron in inches  $\times 3.34$  = lbs. per lineal foot.

Diameter of wrought iron in inches squared  $\times 2.64$  = lbs. per lineal foot.

A freely falling body traverses a distance of 16.08 feet the first second.

The distance traversed in any number of seconds is equal to  $16.08 \times$  number of seconds squared.

A horse power represents the ability to raise 33,000 pounds one foot high in one minute.

Water weighs about  $62\frac{1}{2}$  pounds to cubic foot.

One acre equals 43560 square feet.

## COMPARATIVE TABLE OF THE UNITED STATES AND METRIC SYSTEMS

Denomination	Equivalent
One grain equals in grammes	0.0648
One pound avoirdupois equals in kilogrammes	0.4536
One ton of 2240 pounds equals in tonnes	1.0160
One ton of 2000 pounds equals in tonnes	0.9071
One inch equals in millimetres	25.400
One foot equals in metres	0.3048
One mile equals in kilometres	1.6094
One square inch equals in square millimetres	645.2
One square foot equals in square metres	0.09291
One acre equals in ares (100 square metres)	40.47
One square mile equals in square kilometres	2.590
One cubic inch equals in cubic centimetres	16.39
One cubic foot equals in cubic metres	0.02832
One cubic yard equals in cubic metres	0.7646
One quart dry measure equals in litres	1.101
One quart liquid or wine measure equals in litres	0.9465
One foot pound equals in kilogrammetres	0.1383
One pound per foot equals in kilogrammes per metre	1.488
One thousand pounds per square inch equals in kilogrammes per square millimetres	0.703
One pound per square foot equals in kilogrammes per square metre	4.882
One pound per cubic foot equals in kilogrammes per cubic metre	16.02
One degree Fahrenheit equals in degrees Centigrade	0.5556

## COMPARATIVE TABLE OF THE METRIC AND UNITED STATES SYSTEMS

One gramme equals in grains	15.433
One kilogramme equals in pounds avoirdupois	2.2047
One tonne equals in tons of 2240 pounds	0.9843
One tonne equals in tons of 2000 pounds	1.1024
One millimetre equals in inches	0.0394
One metre equals in feet	3.2807
One kilometre equals in miles	0.6213
One square millimetre equals in square inches	0.00155
One square metre equals in square feet	10.763
One are (100 square metres) equals in acres	0.02471
One square kilometre equals in square miles	0.3861
One cubic centimetre equals in cubic inches	0.0610
One cubic metre or stere equals in cubic feet	35.3105
One cubic metre equals in cubic yards	1.3078
One litre (one cubic decimetre) equals in cubic inches	61.017
One litre equals in quarts, dry measure	0.908
One litre equals in quarts, liquid or wine measure	1.0566
One kilogrammetre equals in foot pounds	7.2331
One kilogramme per metre equals in pounds per foot	0.6720
One kilogramme per sq. millimetre equals in pounds per sq. inch	1422.
One kilogramme per sq. metre equals in pounds per sq. foot	0.2048
One kilogramme per cubic metre equals in pounds per cubic foot	0.0624
One degree Centigrade equals in degrees Fahrenheit	1.8



## METRIC CONVERSION TABLE

Millimetres $\times .03937$ = inches.	Hectolitres $\times .131$ = cu. yds.
Millimetres $\div 25.4$ = inches.	Hectolitres $\div 26.42$ = gals. (231 cu. in.)
Centimetres $\times .3937$ = inches.	Grammes $\times 15.432$ = grains
Centimetres $\div 2.54$ = inches.	Grammes $\div 981.$ = dynes.
Metres $\times 39.37$ = inches.	Grammes (water) $\div 29.57$ = fluid oz.
Metres $\times 3.281$ = feet.	Grammes $\div 28.35$ = oz. avoirdupois.
Metres $\times 1.094$ = yards.	Grammes per cu. cent. $\div 27.7$ = lbs. p.
Kilometres $\times .621$ = miles.	cu. in.
Kilometres $\div 1.6093$ = miles.	Joule $\times .7373$ = ft. lbs.
Kilometres $\times 3280.8693$ = feet.	Kilo-grammes $\times 2.2046$ = pounds.
Sq. Millimetres $\times .00155$ = sq. in.	Kilo-grammes $\times 35.3$ = oz. avoirdupois.
Sq. Millimetres $\div 645.1$ = sq. in.	Kilo-grammes $\div 907.2$ = tons (2000 lbs.)
Sq. Centimetres $\times .155$ = sq. in.	Kilo-gr. p. sq. cent. $\times 14.223$ = lbs. p.
Sq. Centimetres $\div 6.451$ = sq. in.	sq. in.
Sq. Metres $\times 10.764$ = sq. ft.	Kilo-gram.-metres $\times 7.233$ = ft. lbs.
Sq. Kilometres $\times 247.1$ = acres.	Kilo-gr. p. Metre $\times .672$ = lbs. per ft.
Hectare $\times 2.471$ = acres	Kilo-gr. p. cu. Metre $\times .062$ = lbs. p.
Cu. Centimetres $\div 16.383$ = cu. in.	cu. ft.
Cu. Centimetres $\div 3.69$ = fl. drams.	Kilo-gr. p. Cheval $\times 2.235$ = lbs. p. H. P.
Cu. Centimetres $\div 29.57$ = fluid oz.	Kilo-Watts $\times 1.34$ = Horsepower.
Cu. Metres $\times 35.315$ = cu. ft.	Watts $\div 746.$ = Horsepower.
Cu. Metres $\times 1.308$ = cu. yards	Watts $\times .7373$ = ft. pounds p. second.
Cu. Metres $\times 264.2$ = gals. (231 cu. in.)	Calorie $\times 3.968$ = B. T. U.
Litres $\times 61.022$ = cu. in.	Cheval vapeur $\times .9863$ = Horsepower.
Litres $\times 33.84$ = fluid oz.	(Centigrade $\times 1.8$ ) + 32 = degree Fahr.
Litres $\times .2642$ = gals. ( 231 cu. in.)	Franc $\times .193$ = Dollars.
Litres $\div 3.78$ = gals. (231 cu. in.)	Gravity Paris = 980.94, centimetres per
Litres $\div 28.316$ = cu. ft.	sec.
Hectolitres $\times 3.531$ = cu. ft.	
Hectolitres $\times 2.84$ = Bu. (2150.42 cu. in.)	

## HUMIDITY

In the manufacture of textile products, either of cotton, wool or silk, the presence of a proper amount of atmospheric moisture is essential for the best results. The amount which nature provides is very irregular and is seldom sufficient. Most progressive textile mills are equipped with a humidifying apparatus to insure a proper amount of moisture, and modern practice favors the use of automatic regulators for keeping the relative humidity constant, and avoiding fluctuations in humidity which otherwise prevent the best production.

Absolute humidity is the actual weight of water vapor present in the atmosphere, stated in grains per cubic foot of air. The higher the temperature the greater is the amount of moisture which the air contains at saturation.

Relative humidity is the ratio between the amount of water vapor which is actually present and that which the air would contain at the same temperature if actually saturated. The ratio is stated as a percentage. For instance, at 70° F. a cubic foot of air saturated with water vapor contains eight grains of moisture. When air at 70° F. is found to contain six grains of moisture the relative humidity is therefore said to be 75%.

For the satisfactory processing of cotton at ordinary temperature, the following is recommended:

	Relative Humidity.
Carding and Drawing	45 to 50%
Combing	60 " 70%
Roving and Fine Fly Frames	50 " 60%
Spinning, Twisting, Spooling and Warping	60 " 70%
Weaving	65 " 80%

Higher humidity than those suggested above may be found necessary for the spinning and weaving of special products.

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